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EACH to His Job—II

(Continued from last week's issue)

LAST week this page set forth some of the reasons why it prefers public construction by contract rather than by the direct employment of day labor.

It is true, of course, that comparisons on some specific day-labor job may show lower costs than the prices bid by reputable contractors, even assuming that all items of cost have been included and that the results are truly comparable as to quality and speed. But one swallow never yet made a summer and no experienced and open-minded public administrator, on so limited an observation, would justify a wholesale resort to day-labor practice on public construction. Indeed, if he were well-informed as well as experienced and open-minded he would know that the weight of trustworthy evidence shows very clearly the higher economy of contract operation.

The very practice of justifying day-labor costs by comparison with contract prices helps to make the point. For this implies that the contractor's bids set the standard; the effort of the public official is to match or better the mark thus set by private enterprise. But assume for a moment the substantial elimination of the contractor. Then we should have destroyed the yardstick of efficient performance. How long then might we expect the efficiency of non-competitive day-labor to be maintained at the pitch to which it now is driven by comparison with contract prices established by competitive bidding? In other words, whatever level of efficiency day-labor now may attain is the effect, once removed, of competitive bidding by contractors. Take that away and you pull the props from under that efficiency.

WHAT is true of the individual job is equally true of construction practice as a whole. Much present-day construction efficiency must be credited to the long line of contractors who, having taken their jobs at low prices, have had to scratch gravel to come out whole. All the inventive ingenuity, resourcefulness and skill that they could command were thrown into their efforts to cut costs and save their skins. Such situations have bred many of the new ideas that now make up the body of construction practice.

To be sure, some men in both private and public employment need no incentives to such effort other than their native genius and driving energy. But they are very few; most of us need the lure of more substantial reward before our eyes and the whip of competition over our backs to bring out our best efforts. And, whether or not we like it, the fact is that public employment offers no such reward and wields no such whip, while most private employment provides both. The spending of funds derived from the taxation of private enterprise is subject to no such rigorous check as is the carning of the profits and other emoluments on which that taxation is levied.

THAT is why it is no disparagement of the skill and devotion of many public servants to resist the encroachment of public administration on the field of productive enterprise. That is why we must guard against swelling the number of tax-spenders and thereby reducing the number of tax-earners. That is why we cannot afford to lay aside the lures and the whips of private enterprise in favor of public administration of productive undertakings. It is not that the private operator is inherently a better man than the public administrator; it is simply that it is one thing to spend an appropriation and quite another to earn a profit.

The professional skill and instincts of the public administrator are of the highest value to the public he serves when they are applied to planning, engineering, inspection and supervision. When it comes to the actual processes of production in any field he would do better to rely on those who must labor constantly under the whip of competitive enterprise.

Willard Chevalier

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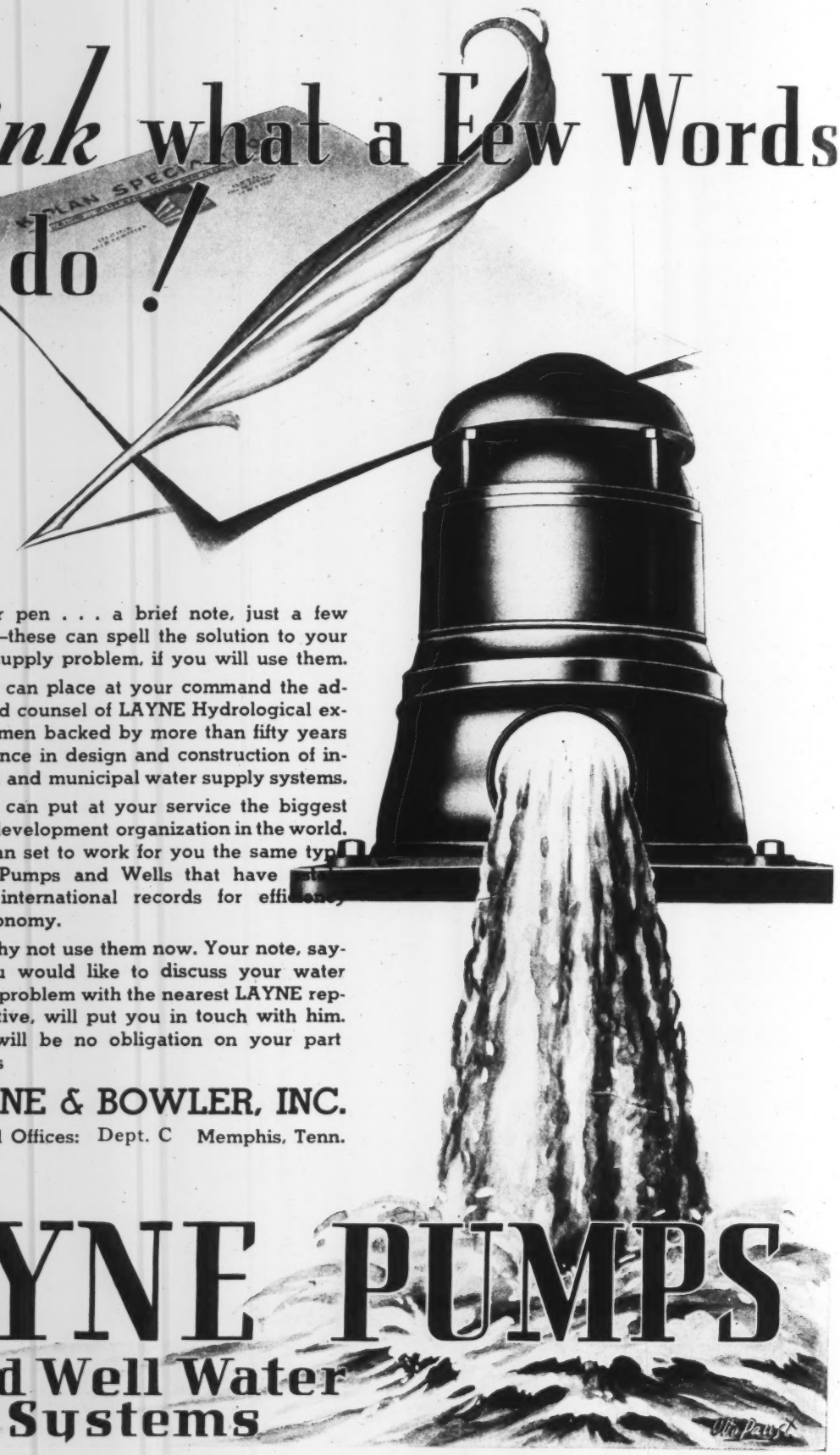

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Again, Something New—THIS TIME sewage treatment and flood repairs furnish the subjects, California and China the locale, next week's issue the opportunity to read about them:

- BIO-FILTRATION is not only a new departure in sewage treatment, but a new word. Experiments in California mark the process as significant.
- INGENUITY and a wheelbarrow army of 25,000 coolies repaired a 1½-mile breach in a dike and brought China's Yellow River back on its course after it had caused $75,000,000 damage.

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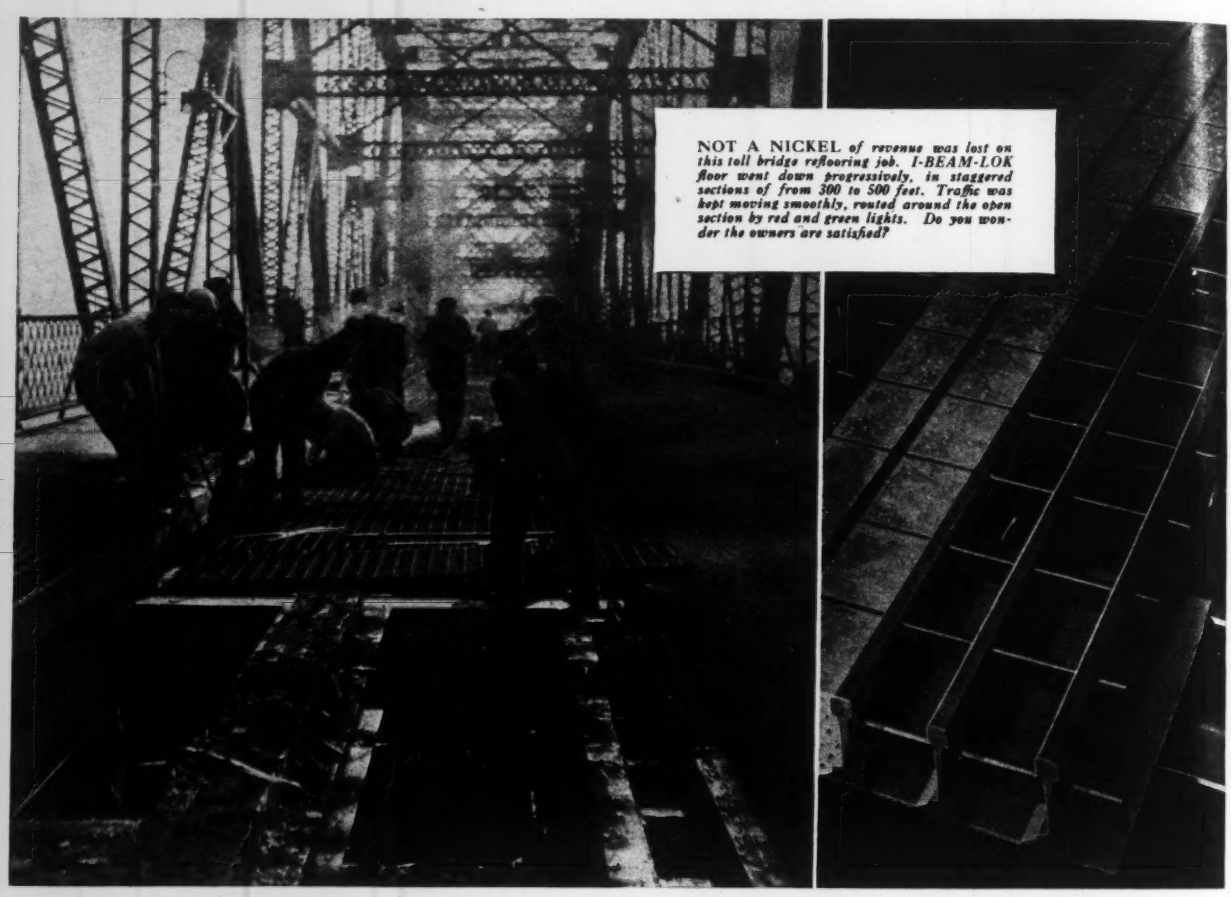

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ENGINEERING NEWS-RECORD

May 14, 1936

MUNICIPAL REFUSE includes wastes of every description.

Basic Principles of Incineration—I

Municipal refuse is a low-grade fuel whose successful incineration depends on a furnace designed in accordance with combustion principles specifically applicable to the characteristics of the material to be burned.

By Edward D. Very
Civil Engineer, Teaneck, New Jersey

THIS IS THE FIRST of two articles on fundamental principles of refuse incinerator design interpreted by an engineer who views the subject from the rich background of 30 years' experience in the field of municipal waste disposal.

Following a brief account of developments taking place during the half century of incineration practice in the United States, this installment discusses the first essential upon which incinerator design must be predicated—the type of fuel to be burned, its analysis and characteristics.

In the second article, to be published next week, Mr. Very deals with refractories and heat control in relation to efficient furnace design and successful incinerator operation. —EDITOR

THE YEAR 1935 marked the semi-centennial of the installation of the first municipal garbage incinerator in this country. During the first twenty-five years of the half century about 180 plants were constructed, but 102 of them were abandoned as unsatisfactory. This is a very disturbing record, particularly in view of the fact that in Great Britain, where the adoption of incineration preceded us by about five years, there were constructed 250 plants, only 10 of which were abandoned.

Why the early plants failed

In my opinion the reason for the initial failure of incineration in one country and its apparent success in the other is that American designers looked on garbage purely as "garbage," while the British viewed it as low-grade fuel. The American idea was that such a soggy, noxious mess should be pre-dried by means of heat generated by commercial fuel (coal or wood) and then the mass consumed in the fire-bed of that fuel. The furnace was usually of the Dutch Oven type, a firebrick-lined chamber in which were installed a primary grate for the fuel and a secondary grate above this where garbage was lodged until dried by the heat developed from below. No attention was given to controlled temperature for assured results; on the contrary, low-temperature operation was considered satisfactory and more economical. This naturally led to the conclusion that garbage incineration was by its very nature a noxious operation and therefore plants should be located in some remote quarter of town or in an industrial district where other plants emitting considerable volumes of dense smoke would tend to minimize the objectionable emissions of the garbage plant. It was also recommended that chimneys should be high enough to diffuse the noxious gases and thus render them innocuous by dilution with fresh air. Happily these erroneous ideas no longer obtain and the choice of location is not difficult.

British designers, on the contrary, from the beginning analyzed the materials according to standard methods of fuel study, then proceeded along lines consistent with fundamental principles of combustion. They adopted high temperatures in order that the evolved gases should be thoroughly consumed and rendered inodorous. Again, contrary to American practice, which ignored the quality of firebrick used, they insisted on first-quality brick in the burning and combustion chambers in order to obtain the full effect of heat storage and radiation, so essential for the complete combustion of the gaseous products. Finally, the British engineers felt that the use of forced draft was essential. Some difference of opinion on this point still exists in this country, but most designers favor the use of draft.

That this failure to consider garbage primarily as a type of fuel still persists in this country was effectively demonstrated at a meeting some years ago held by the mayor and council of a certain city on the matter of a proposed incinerator installation and for the presentation of the claims of competitive designs. There were but two representatives from incinerator manufacturers present and they were allowed to present their claims orally. After both had been heard the mayor asked one of them to give the differences between the two designs in brief and simple language. The competing engineer demanded that he

also be heard—his answer was: "Their incinerator is designed to burn British wastes, while ours is designed to burn American wastes." This patriotic outburst had considerable to do with his obtaining the award, and so an entirely erroneous impression was permitted to remain in the minds of these laymen, who were entitled to a better understanding of the problem they were endeavoring to solve. While it is true that American and British wastes as received at the plants for disposal may differ in their proportion of constituents the constituents themselves do not differ materially.

STOKING FLOOR of a battery of three 100-ton incinerator furnaces.

When the second twenty-five-year period of American incinerator design is reviewed it is pleasing to record that more than 500 plants were installed, of which only 44 have been abandoned; and further that the companies whose plants had originally failed to make good have since modified and improved their desgns so that they now conform to standards offering satisfactory performance. Incidentally it may be further noted that those pioneer companies whose designs had been unsatisfactory and who have now retired from the field deserve some degree of commendation. They at least gave impetus to the method and furnished exhibits which could receive practical observation for guidance in designing future effective installations.

Near the end of the first period the first British type of incinerator was introduced to this country—at New Brighton, Staten Island. While satisfactory in its performance it did not make a striking impression, perhaps because the materials consumed were an intimate mixture of garbage, ashes and rubbish. Because refuse was collected in this mixed fashion it was thought to be similar to the material usually obtained from the British "dust bins." It was a wrong assumption to believe that it was essential to have such a combination of materials in order to obtain results from this type of incinerator. And so the aforesaid erroneous impression regarding the difference in national wastes continued.

It is of interest to compare the Staten Island mixture with the British one, in order that this point may be cleared up at the outset. The following table gives the comparative mechanical analyses of average London and Staten Island wastes:

	London % By Weight	Staten Island % By Weight
Garbage	5.0	34.2
Ashes	70.5	48.2
Combustible Rubbish	7.9	11.2
Incombustible Rubbish	3.1	6.4
Dust and Dirt	13.5	....
	100.0	100.0
Garbage—Animal	8	17
Vegetable	92	83
Ashes—Fines	64	47
Cinders	35	20
Coke	1	33
Rubbish	No record, but probably not dissimilar.	

Whether or not the installation of this plant had an influence on American designers, the fact remains that it emphasized the logic of attacking the problem of garbage incineration from the angle of fuel consumption. With these statements recorded, let us turn to the problem as we find it here.

Incineration and the future

It is rather consoling to those of us who are interested in the matter of incineration to note that in spite of the rather painful experience of the first period public officials still have faith in their technical advisers and believe that the initial setbacks can and will be overcome. The tendency toward incineration, predicated probably on the ancient idea of purification by fire is shown in a survey made in 1932 by the magazine, *Public Works*. The results showed the following changes in twenty-five years:

	1906	1931
Reduction	12%	2%
Incineration	17	42
Hog Feeding	24	48
Dumping	47	8

Perhaps I may be permitted to stray from the subject we are discussing in order to suggest that it would be beneficial to everyone concerned if the methods of high pressure salesmanship (whereby representatives of incinerator manufacturers, designers and constructors subordinate intrinsic values to outstanding selling points) be discarded and that the claims for specific advantage of their several designs be made in accordance with accepted practice in other high-grade commercial promotion. Less emphasis should be placed on the disease-breeding menace inherent in garbage, which is a fallacy, and more on the thoroughly effective results from incineration which may be obtained with no offense.

The near future will undoubtedly see more general utilization of the waste heat from incineration, and this will react in considerable benefit to the communities so disposing of their wastes. At Atlanta, for instance, steam is being generated and sold to the local power company; at Niagara Falls, steam so generated supplies the requirements of the municipal asphalt plant; at Philadelphia, steam generated at one incinerator plant is piped to steam-jacketed dryers wherein garbage is de-hydrated preparatory to its processing in the reduction plant; there may be others, of which I am uninformed, but here we have evidence that this economy feature is receiving attention.

Municipal refuse as a fuel

It is generally conceded that the three essentials for efficient furnace operation are: fuel, refractories and heat control.

The basic data that must be considered in advance of design are: (1) the analysis of the fuel, proximate or ultimate, preferably the latter; (2) the calorific value of the fuel; (3) required air supply, which may be determined from a study of the analysis with due allowance for necessary excess; (4) composition of the products of combustion, which may also be derived from the analysis and air supply determination; (5) critical temperatures to be attained and maintained in the furnace.

A proximate analysis itemizes the percentages of (a) combustible (may be subdivided into fixed carbon and volatile matter); (b) ash, and (c) moisture. An ultimate analysis notes the percentages of proteins, fats, carbohydrates, ash and moisture or records these as carbon, hydrogen, oxygen, sulphur, nitrogen, ash and moisture. The calorific value of the fuel may be obtained by cal-

culation using the factors of an ultimate analysis for conversion into final products of combustion; another method is to test a sample of the fuel in a bomb calorimeter.

For required air supply, turn to the ultimate analysis and apply the amounts of air required to complete the combustion, *i.e.*, C to CO_2, S to SO_2, $H + \frac{O}{8}$ to H_2O (hydrogen plus oxygen in the fuel being satisfied). If the proximate analysis is the only one available, there is an empirical formula, derived from a comparison of the requirement for coal, according to its calorific value, with the fuel in question.

$$A = 7.4 \frac{C.V.}{10{,}000}$$

A = lbs. of air required per lb. of fuel.

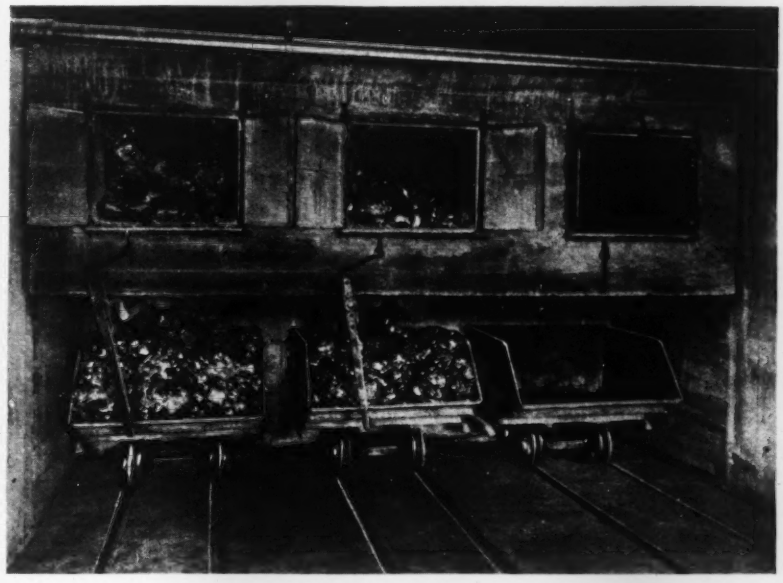
$C.V.$ = the calorific value of the fuel.

10,000 = the calorific value of the coal used for comparison.

To the value obtained by either method must be added the required excess air (generally assumed to be 100 per cent for natural draft, 50 per cent for forced draft). Incidentally it should be noted that the areas of gas passageways should be calculated on 100 per cent excess; the fan capacity on 50 per cent excess.

As to the composition of the products of combustion, it is necessary to determine both the weights and volumes of the CO_2, H_2O and SO_2, plus the H_2O which appears a moisture in the analysis. Where the ultimate analysis is available this is an elementary problem, but if one has to depend upon a proximate analysis it is customary to consider the combustible content as carbon and proceed accordingly; this assumption is somewhat in error, but not sufficiently to cause material variation from the actual condition. I find no satisfaction in recording these rule of thumb methods, but feel that they should be stated just as the conditions demand.

Experience in the matter of critical temperatures indicates that a value of 1,250 deg. F., slightly above the ignition points of carbon monoxide and hydrocarbons, is essential to assure complete combustion and thus to avoid noxious gas emissions from the chimney. It is not, however, sufficient to provide means for maintaining exactly this temperature because the opening of charging and stoking doors causes inrushes of cooler air; a higher heat, averaging 1,450 deg. F., should be provided in order to assure a safe margin against these cooling actions. It may be well to note here that, while a slightly higher temperature may be of advantage, there is no point in increasing the heat too much, because it serves no useful purpose and in addition subjects the structural materials of the furnace to stresses uncalled for in normal practice. Higher temperatures are warranted only when steam generation is contemplated, in which case 1,800-1,900 deg. F. may be required.



COMPLETE COMBUSTION produces an odor-free ash easily disposed of as fill material.

Making an analysis

Although garbage and rubbish are heterogeneous accumulations subject in quality and quantity to individual whims, there is actually a close similarity in composition even in widely separated parts of the country. Therefore it is not unusual for incinerator installations to be designed without referring to an analysis of the refuse to be consumed; performance guarantees are also generally made without specific data.

It may be of interest to describe a method of obtaining an analysis which I employed in Philadelphia some years ago. While the reduction process is the established method of disposal in that city, a very substantial amount of garbage is collected and disposed of by private hog feeders in the outlying territory. I arranged with one of these to collect one truck load for each of several districts and to haul the collection to his farm, where I had erected a platform. This platform was about 14 ft. square, and the surface was constructed of tongue and grooved planking, to assure watertightness. Upon the arrival of each load, the free water, which had been expressed during the haul, was drawn off and weighed; the load was then dumped onto the platform and spread as far as practicable; all rubbish, which might resist chopping, such as paper, rags, cardboard dishes, bottles, tin cans and the like, was separated and weighed; bones were removed in like manner and also weighed. The whole mass was then chopped and turned over by shovels until the constituents appeared to be thoroughly intermixed. From this pile a two-quart sample was delivered to an industrial chemist for analysis. The following tabulation shows the results obtained:

	1	2	3	4
Weight of Load, Lb.	4000	4400	4600	3200
Length of Haul, Mi.	12.0	12.5	11.5	10.0
Free Water, Lb.	470	375	360	300
Rubbish, Lb.	375	375	260	150
Bones, Lb.	325	325	300	150
Chemical Analysis (Percentages by weight)				
Moisture	78.4	78.3	79.4	81.0
Grease	3.3	5.3	5.7	5.4
Tankage	18.3	16.4	14.9	13.6
Ammonia	0.647	0.786	0.742	0.969
Phosphoric Acid	0.165	0.205	0.159	0.259
Potash	0.312	0.259	0.312	0.285

Note—District 1 better residential
" 2 average residential
" 3 & 4 poorer residential

Combustibility of garbage

With the foregoing data at hand it is next necessary to determine whether garbage is auto-combustible and, if so, whether it will produce the temperature decided upon as critical in the combustion chamber. For this purpose we refer to a heat balance, crediting the material with its calorific value plus the heat of the air in excess of that due to equal temperatures of air and fuel, and debiting it for heat losses due to: (1) evaporation of the moisture content, (2) transmission of heat through and radiation from the furnace walls, (3) unconsumed portions of the combustible content discharged with the ashes from the grates, usually estimated at 1 per cent of the original, (4) heat carried away in the ashes. Since the factors used are in British thermal units, the result must be converted into degrees Fahrenheit for comparison with the critical temperatures. This can be done with the air of a "conversion factor," which is the product of the weight of the gaseous products from one pound of fuel multiplied by the specific heat of such products; this latter item is obtained by adding together the specific heats of the constituent gases proportioned as they appear in the total product.

For example, assuming we have a pound of mixture whose gaseous products weigh 4.5 lb., containing 1.760

B.t.u.'s of heat and having a specific heat of 0.264: In order to ascertain the equivalent temperature of this gas, we first find the unit heat content by dividing the total 1,760 by the weight 4.5, resulting in 391 B.t.u. per pound of gas. This will register a temperature of 391 divided by 0.264, or 1,481 deg. F. In practice we combine these divisors, 4.5×0.264, terming the result, 1.19, the "conversion factor."

It will be found that garbage unmixed with other refuse is not auto-combustible; auxiliary fuel must be provided. At first, designers turned to ashes as collected, they being obviously rich in unconsumed carbon. Later it was found that the rubbish as produced furnished a sufficient heat value and it was preferable to ashes because it did not involve the removal of such a bulk of residue. It may also be said that the emphasis on the collection of rubbish for this purpose tended to eliminate potential fire hazards in many homes.

A mixture of 80 per cent garbage with 20 per cent rubbish supplied with air preheated to 300 deg. F. is auto-combustible; mixtures of 60 per cent garbage and 40 per cent rubbish, down to 50:50 will burn satisfactorily without preheated air. From this latter proportion as the ratio of rubbish increases, strangely enough the maintenance of required temperatures becomes increasingly difficult. This is probably due to the fact that rubbish is an explosive fuel and requires retardation in a furnace designed for controlling temperatures by heat storage and radiation from the refractory linings.

There have been attempts made to overcome this difficulty by sprinkling the rubbish with water prior to its introduction into the furnace; this procedure has no merit because the intense heat generated by rubbish dissociates the hydrogen content of the water to form water gas which has a very high calorific value and therefore further complicates matters.

In the event that rubbish is not available for any reason, it is customary to resort to a commercial fuel such as coal or wood. In such case, the auxiliary fuel should be intermixed with the garbage prior to its charging into the furnace. This insures a combination gas generation in the furnace instead of a condition of gas streaming which is difficult to control to assure complete combustion.

Summarization

From a study of the failure of many of the earlier refuse incinerators coupled with the experiences obtained in subsequent installations it is possible to formulate certain basic requirements that are essential to proper furnace design. These are based upon the following established premises: (1) that garbage is a low-grade fuel and should be studied and treated according to established methods for fuel burning generally; (2) that garbage is invariably not auto-combustible and therefore demands admixture of auxiliary fuel; (3) that this combination shall be so proportioned as to assure the attainment of a certain established critical tempertaure when brought to a state of complete combustion, in order to insure the elimination of noxious fumes; (4) that operating conditions demand a higher temperature than the critical value for combustion in order that the critical temperature may be maintained at all times; (5) that household rubbish furnishes this assistance when proportioned at not less than 20 per cent of the mixture; (6) that if rubbish is not available, commercial fuel is the next best for the purpose; and (7) that the use of forced draft and preheated air to support combustion are essential, the latter being unnecessary only when the percentage of garbage in the mixture is less than about 60 per cent.

Arching in Sands

Pressure changes are caused by elastic movements within sand fill supported by timbering, and shearing stresses due to these movements relieve the pressure as the timbering deflects slightly

By Karl Terzaghi
Visiting Professor, Harvard University, Cambridge, Mass.

(Condensed from a paper read before the Boston Society of Civil Engineers and printed in full in the Journal of the Society for April, 1936.)

ONE OF THE MOST striking contradictions between the customary earth-pressure theories and experience in actual construction work lies in the distribution of pressure on lateral supports. According to theory the pressure of sand on the back of a lateral support should increase like hydrostatic pressure in direct proportion to depth. This hydrostatic pressure distribution is supposed to exist regardless of whether the sand is retained by a masonry wall or by timbering. On the other hand many engineers and contractors with broad experience in subway construction claim that the distribution of the lateral pressure of sandy soils on the timbering of cuts has no resemblance to the theoretical distribution.

In this connection attention should be called to two important papers by J. C. Meem[1] and by H. G. Moulton[2]. The authors of both papers as well as many of those who participated in the discussion expressed the opinion that the contradiction between theory and reality is due to the arching of the sand in the space located behind the timbering. Our increasing knowledge of the relation between stress and strain in sands has fully confirmed these intuitive conclusions of two eminently practical engineers. It has also revealed the fundamental principles of the arching effect and thrown new light on the limitations of the validity of current earth pressure theories in general.

Natural state of stress

To understand the causes and the universal occurrence of arching it is advisable to begin with an analysis of the state of stress in an untouched natural deposit of sand with a horizontal surface. In such a deposit the lateral pressure increases like hydrostatic pressure in simple proportion to the depth below the surface and the ratio between the lateral and the vertical pressure is in every point of this deposit a constant value K_o. This value is called the hydrostatic-pressure ratio at rest or the *natural hydrostatic pressure ratio*. It has no relation whatsoever to the angle of internal friction of the sand. It merely depends on the elastic properties of the sand.

The following values of K_o were obtained and verified by several independent experimental methods:

Dense sand	$K_o = 0.40$ to 0.45
Loose sand	$K_o = 0.45$ to 0.50

The validity of these figures is limited by the condition that the bed of sand to which they refer has never been subject to a temporary surcharge. The application and subsequent removal of a surcharge seems to increase the value of K_o.

Owing to the simplicity of the natural state of stress in an undisturbed stratum of sand the pressure which acts on any section through this bed can easily be computed. For any plane section the pressure increases like hydrostatic pressure in simple proportion to the depth below the surface. If we replace any limited part of this deposit by a shaft or a cut with a perfectly rigid lining the state of stress in the sand remains unchanged. Fig. 1 shows the pressure which would act on the rigid lining of a trench or cut, a gallery and a shaft.

Anyone familiar with Rankine's earth-pressure theory will recognize in Fig. 1 the mental operation on which this theory is based. This operation involves the assumption that the process

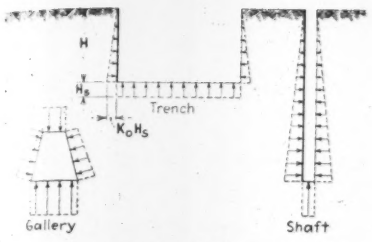


FIG. 1—PRESSURE which would act on various excavations if the construction operations did not alter the state of stress in the sand. The diagram also illustrates Rankine's earth pressure theory.

of excavation and of timbering does not alter the state of stress which existed in the sand prior to excavation. However, Rankine also assumed that the hydrostatic-pressure ratio for the undisturbed deposit is equal to

$$K_r = \tan^2(45\text{-}\phi/2) \qquad (1)$$

wherein ϕ is the angle of internal friction. In reality this ratio is equal to K_o, which may be several times as great as K_r, and no process is known which would make it possible to reduce the value K_o to K_r over more than a very limited section of a bed of sand. Furthermore the operations illustrated by Fig. 1 cannot be performed except in our imagination.

The reasons are obvious. First of all, no real excavation can be made without giving the sand an opportunity for some lateral expansion; and, second, the bottom of excavations in dry sand is always left unlined, at least during the period of construction. Hence the normal stresses which are shown in Fig. 1 along the bottom of the excavations do not exist. Each one of these two groups of facts alone would suffice to eliminate any resemblance between the true state of stress along the boundaries of the excavations and that shown in Fig. 1. Hence we face the question as to what the real state of stress in the vicinity of excavated spaces may be.

Experience has shown that these stresses are very much lower than those indicated in Fig. 1. To estimate the intensity of these real stresses it is necessary to consider the importance of the deformations required to reduce the stresses from their initial values shown in Fig. 1 to the final values corresponding to reality.

Strain effect of local expansion

If a natural deposit of sand has an opportunity to expand laterally throughout its entire extent, its surface subsides uniformly and at the same time the hydrostatic-pressure ratio decreases from its initial value, K_o, to a minimum value. According to Rankine's earth-pressure theory, this minimum value is equal to K_r, (Eq. 1). However, to reduce the value K_o to K_r, the lateral expansion of a deposit of dense sand must be equal to at least 1.5 per cent of the width of the total deposit, or 1.5 ft. for each 100 ft. of this width. For a stratum of loose sand the required amount of lateral expansion is still greater. In nature such an energetic expansion can never occur except within a very limited zone of the layer of sand.

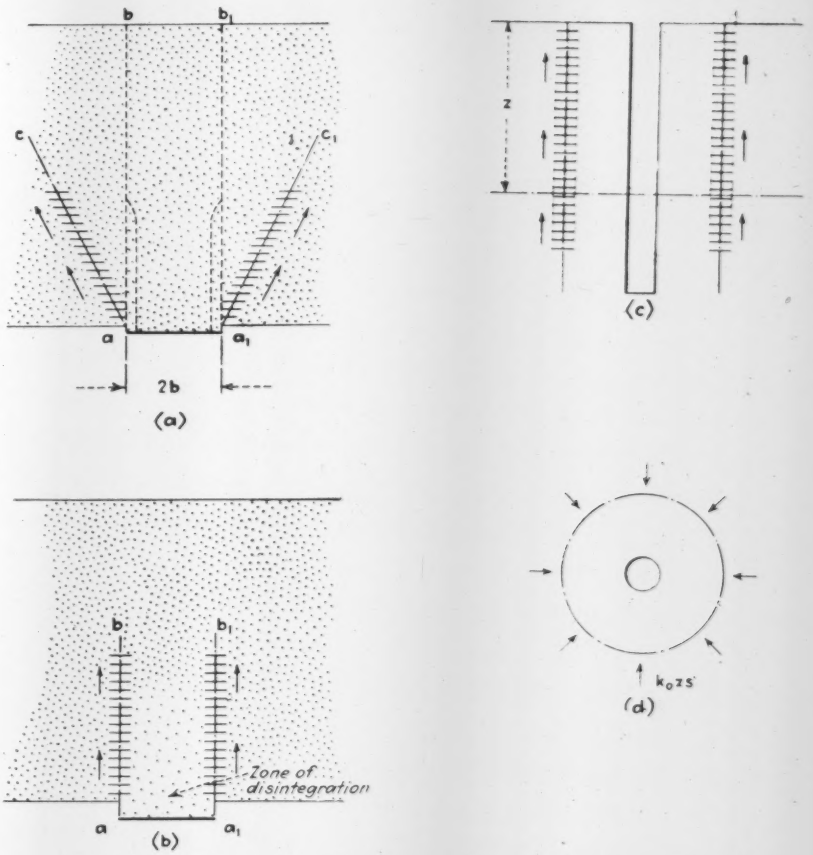


FIG. 2—ZONES of local shear produced *(a)* by a very small and *(b)* by a considerable downward movement of a trapdoor beneath a bed of sand. Diagrams *(c)* and *(d)* illustrate the shear zones and the ring effect produced by shaft sinking.

Since any lateral expansion is always associated with a vertical shortening of the laterally-expanding material, the body of sand located *above* the expanding zone has a tendency to move downward. A local subsidence within a body of sand produces shearing stresses along the lateral boundaries of the subsiding zone. These shearing stresses relieve the vertical pressure which previously acted on the zone of local expansion and transfer these pressures onto that part of the stratum not subject to subsidence. This phenomenon is called the *arching effect*. The following examples illustrate the mechanics of this effect.

Arching above yielding trapdoors

Let us consider a stratum of sand, Fig. 2*a*, with a unit weight *s* and a horizontal surface, supported by a rigid horizontal base which contains a rectangular trapdoor, aa_1. Before the trapdoor changes its original position every part of the base, including the trapdoor, stands under a vertical pressure which, like the pressure of a liquid, acts on every part of the base with the same intensity, *Hs*, per unit of area. However, the slightest downward movement of the trapdoor suffices to reduce the vertical pressure on the door to a small fraction of what it was before. This fact has been known for more than a hundred years.

The mechanics of this transition from the original into the ultimate state of stress are shown in Figs. 2*a* and 2*b*. As long as the downward movement of the trapdoor remains very small it merely produces a vertical expansion and a lateral contraction of the lower part of the body of sand, aa_1, bb_1, Fig. 2*a*, located above the trapdoor. As a result of this deformation, the sand located on both sides of this body is allowed to expand laterally, like the backfill of a yielding retaining wall. Since a lateral expansion is always associated with a vertical contraction, shearing stresses develop within two inclined zones, ac and a_1c_1. These shearing stresses transfer part of the weight of the sand located between ac and a_1c_1 onto the undisturbed part of the sand beyond the zone aca_1c_1.

As the trap door yields still farther, the structure in the sand located immediately above the door disintegrates,

owing to excessive expansion, whereupon the planes of minimum resistance shift from the position shown in Fig. 2*a* to the boundaries ab and a_1b_1 of the zone of disintegration in Fig. 2*b*.

Similar arching phenomena are also associated with the sinking of shafts. If a shaft could be sunk through a natural sand deposit in such fashion as to leave the original state of stress unaltered, the lining would be subject to the forces indicated in Fig. 1*c*. For values of s equal to 120 lb. per cu.ft. and K_o equal to 0.40, the lateral pressure on the lining of a shaft with a depth of 100 ft. would increase from zero at the top to 4,800 lb. per sq.ft. close to the bottom. Yet experience indicates that the lateral pressure on the timbering of shafts through sand is very small and practically independent of the depth, provided that the bottom of the shaft is located above the groundwater level.

One of the most striking phenomena of this kind was observed in connection with hydraulic rotary drilling of oil wells in Texas. In this state the drillers sometimes pull 700 or 800 ft. of casing at one time; nevertheless in most cases the drill hole remains open although the strata consist exclusively of unconsolidated sand and clay. Within the clay the cohesion is sufficient to prevent the walls of the holes from collapsing. However within the sand the only protection against failure is the thin coating of puddle introduced into the hole during the drilling operations. If the pressure on the lining of the hole were identical with that indicated in Fig. 1, extra heavy casings would be required to keep the holes open. Hence the real pressure on the lining represents an insignificant fraction of what it should be according to Rankine's theory illustrated by Fig. 1.

The striking difference between the state of stress before and after a shaft or a hole was made can only be due to the failure of the lining to prevent a lateral expansion of the sand which surrounds the shaft. As noted above, a lateral expansion of the sand is always associated with a shrinkage in a vertical direction. Since both the lateral expansion and the vertical shrinkage are limited to a cylindrical zone surrounding the shaft, shearing stresses develop along the outer boundary of this zone as shown in Fig. 2*c*. These shearing stresses transfer part of the weight of the sand adjoining the shaft onto the unaltered material outside of the zone of expansion. This transfer is called the *bin effect* because it closely resembles the transfer of part of the weight of the contents of a storage bin to the wall of the bin.

In the sand which surrounds the shaft this bin effect combines with what may be called the *ring effect*, illustrated by Fig. 2*d*, which represents a horizontal section through the shaft. Prior to the excavation of the shaft, the horizontal normal stresses were equal in every horizontal direction within the plane shown in the figure. While the shaft is being excavated, the sand expands in a radial direction towards the shaft, which in turn produces compression in every tangential direction. This state of stress resembles the state of stress in a hollow cylinder under external pressure and involves a reduction of the radial pressure against the lining of the central, cylindrical space.[3]

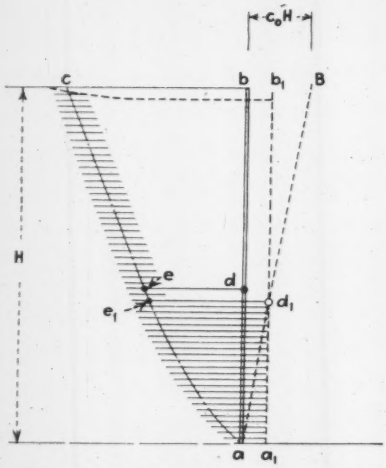


FIG. 3—MECHANICAL CAUSES of non-hydrostatic pressure distribution over the back of a lateral support after the support has yielded from ab to a_1b_1; abB = minimum yield required to produce hydrostatic pressure distribution. Owing to the excessive lateral yield of the lower part, ad of the lateral support, the lower, shaded part of the wedge abc subsides. The upper part must follow in spite of inadequate lateral expansion which, in turn, mobilizes the maximum shearing resistance along the balance ec of the surface of rupture.

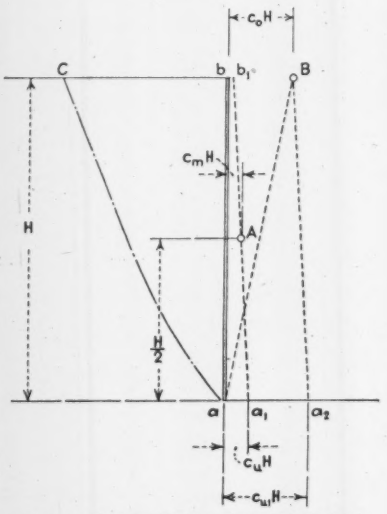


FIG. 4—CONDITIONS FOR VALIDITY of Coulomb's theory. While the wall moves from ab into any position passing through point A, with the abscissa $c_m H$, the total lateral pressure decreases from natural to Coulomb value. Yet at this stage the distribution of lateral pressure is non-hydrostatic. During further movement into any position passing through B, with the abscissa c_oH, the distribution of lateral pressure gradually becomes hydrostatic while the total pressure remains practically unaltered. This second stage terminates with a slip.

Arching behind lateral supports

A third type of arching in sands must be expected if the lateral support of a bank of sand yields in such manner as to permit an expansion of the lower part of the bank equal to or in excess of the lateral expansion of the upper part. This is illustrated by Fig. 3. If the lateral support, ab, were perfectly rigid, the lateral pressure of the sand would be identical with the pressure indicated for the trench in Fig. 1. This pressure is equal to $K_o \cdot 1/2H^2s$. On the other hand, if the lateral support yields, the lateral pressure decreases and approaches the minimum value determined by Coulomb's earth-pressure theory. Finally a slip occurs along an inclined surface of rupture, ac, Fig. 3. Since the sand located on the left side of ac rests on the rough, horizontal surface of a bed of sand in a state of almost complete lateral confinement, the lateral expansion of the fill is practically limited to the wedge-shaped zone abc, Fig. 3, whose width increases with the weight above the base of the fill.

If the support yields by tilting around its lower rim, a, from its original position ab to position aB there is little opportunity for arching. On the other hand, if the support yields from ab to a_1b_1 the following events will occur. Owing to the excessive lateral expansion of the lower part, ade of the wedge abc in Fig. 3, the entire body of sand located above this lower part is compelled to move downward. This downward movement mobilizes the full shearing resistance along the boundaries of the wedge, which in turn reduces the total lateral pressure of the sand to the smallest value which it can possibly assume. This smallest value is determined by Coulomb's earth pressure theory. Yet at this stage the distribution of the lateral pressure is far from being hydrostatic, because the shearing stresses along ce and bd reduce the vertical pressure on the lower part of the wedge. Therefore along bd the lateral pressure will be considerably greater and along ad it will be considerably smaller than that corresponding to a hydrostatic distribution of the pressure. The pressure distribution does not become hydrostatic until the lateral support has yielded to a position which is entirely located beyond the line aB in Fig. 3.

An analysis of the phenomena illustrated by Fig. 3 published elsewhere[4] disclosed the limitations on the validity of Coulomb's earth pressure theory. Fig. 4 is a graphic representation of these limitations. The meaning of the symbols is explained in the caption to the figure. For a dense sand the values c_m and c_o were found to be of the order of magnitude of 0.0005 and 0.005, respectively. The greatest departure from the hydrostatic pressure distribution de-

pends on the value c_u/c_m. For $c_u/c_m = 0$, corresponding to a tilting movement of the support, this departure is unimportant. However with increasing values of c_u/c_m there is a rapid increase in the difference between hydrostatic and actual pressure distribution.

For any sand in a loose state the distribution of the lateral pressure seems to be almost hydrostatic for any type of movement from the very beginning of the first stage throughout the following ones. At the same time the average yield $c_m H$ required to obtain the theoretical Coulomb pressure appears to be very much greater than $0.0005H$.

Lateral pressure of cohesive soils

The same type of reasoning which led to Fig. 4 applies without modification to cohesive soils. From general construction experience the following tentative conclusions were reached concerning the earth pressure exerted by cohesive soils. For sandy, cohesive soils the difference between the real and the hydrostatic pressure distribution may be still more important than it is for non-cohesive sands. In many cases the greatest lateral pressure develops in the vicinity of the upper rim of the cut. This fact is known to every experienced foreman. For plastic clays the value $c_m H$ in Fig. 4 is likely to be far in excess of the greatest possible shortening of the struts under axial pressure. If this is the case the earth pressure theories fail to furnish any information on the lateral pressure which acts on the timbering. Further complications are likely to arise on account of volume changes produced by continuous rains. For this reason the treatment of cohesive soils has here been excluded.

Practical conclusions

Any failure of a retaining wall by tilting or sliding involves the passage of the upper rim of the back of the wall through the position B in Fig. 4. This event is automatically associated with a transition from the non-hydrostatic into the hydrostatic distribution of the lateral pressure. Therefore the facts shown in Fig. 4 require no modification of the present method of the computation of the lateral pressure on retaining walls provided that the backfill consists of dry sand and that the upper rim of the retaining wall can yield at least through the distance $bB = c_o H$, shown in Fig. 4.

On the other hand, in connection with the lateral pressure of sand on a lateral support with a very limited capacity for yielding, such as the strutting of cuts, the non-hydrostatic pressure distribution associated with a position of the upper rim of the lateral support to the left of point B in Fig. 4 becomes a factor of decisive practical importance. The assumption of hydrostatic pressure distribution upon supports of this type involves an error which may even be fatal.

Hence the fundamental misconception associated with the traditional earth-pressure computations does not reside in the theories as such. It lies in the failure of the designers to consider the limitations on the validity of the theoretical results. Fig. 4 reveals these limitations at a single glance.

[1]*Meem, J. C.: The bracing of trenches and tunnels, Trans. Am. Soc. C. E., Vol. LX, June, 1908.*

[2]*Moulton, H. G.: Earth and rock pressures, Trans. Am. Soc. of Min. and Metall. Eng., 1920.*

[3]*Terzaghi, K.: Erdbaumechanik. Wien, 1925.*

[4]*Terzaghi, K.: A fundamental fallacy in earth pressure computations, Journ. Boston Soc. C. E., April, 1936.*

Temperatures in Concrete Arches

Key pours in ribs of Calvert and P St. bridges in Washington, D. C., delayed from 7 to 10 days while concrete cooled from maximum temperatures ranging from 98 to 121 deg.

By C. R. Whyte
Engineer of Bridges, District of Columbia

TWO CONCRETE ARCH bridges located in Calvert Ct. and P St., Washington, D. C. were under construction simultaneously during 1934-1935. It was considered advisable to secure data on the temperatures generated in the concrete ribs with a view to delaying the pouring of keys until such time as the average rib temperature had dropped to a predetermined value. The purpose of the observations was entirely practical; funds did not permit the purchase of self recording instruments, and personnel limitations prohibited extended periods of readings at short intervals. The observations should not therefore be considered as a scientific test. Those data which are presented here, however, are derived from readings taken at hourly periods for two to three days, except in one case, and at irregular intervals thereafter. The results show the temperature variations at different locations in the various sizes of sections and indicate also, for the particular sections, the effects of air temperatures, preheating of concrete and, to some extent, the insulation affect of forms and the conductivity of stone facing.

The Calvert St. Bridge consists of three spans of 146 ft., each span having four ribs varying from 8 ft. at the crown to 15 ft. 4 in. in thickness at the springing. The P St. Bridge consists of two spans of 94 ft. 10 in., each span having three ribs varying from 2 ft. 9 in. at the crown to 4 ft. 2 in. in thickness at the springing. Fig. 1 shows the elevations and cross sections of the spans of the two bridges with the main dimensions, the location and order of concrete pours and the planes in which the thermometers were placed. Sections in two adjacent ribs of one span were poured simultaneously in the Calvert St. Bridge and sections in adjacent ribs of both spans were poured simultaneously in the P St. Bridge. The two bridges offered four different sections for observation. Since the P St. ribs varied little in thickness and adjacent spans were poured simultaneously, thermometers were placed only in the third pour of the outer and center ribs of the west span. In Calvert St. however there were six arch pours of two ribs each, and thermometers were placed in the fourth section in each of the six arch pours, in the first section of the first arch pour, and one thermometer

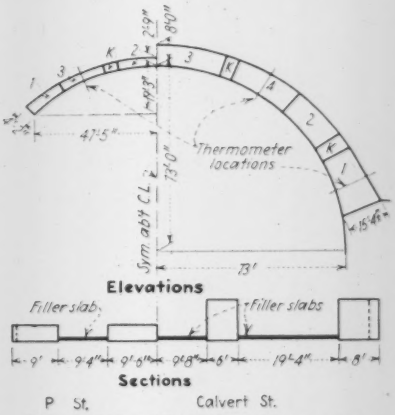


FIG. 1—RIB AND POUR arrangement on Calvert and P St. concrete bridges in Washington, D. C.

was placed in one key section. All thermometers were placed in the outside ribs.

Potomac River sand and gravel and steel centers were used in both bridges. Lagging for the arch soffit was 3 in. S4S in the P St. Bridge and 2 in. T&G in the Calvert St. Bridge. All other lagging in both structures was 5/4 except that the soffits and 2 ft. of the exposed concrete sides of the ribs were lined with plywood in the Calvert St. Bridge. Twenty-eight day cylinder tests of concrete averaged 3005 lb. per sq. in. for P St. and 2780 lb. per sq. in. for Calvert St. The thermometers consisted of copper resistance coils ranging from 400 to 900 ohms encased in metal and with bulbs and leads waterproofed.

The readings in detail

Fig. 2, Calvert St., shows the heaviest section observed. No forms were stripped until practically the end of these readings, and since instruments No. 1

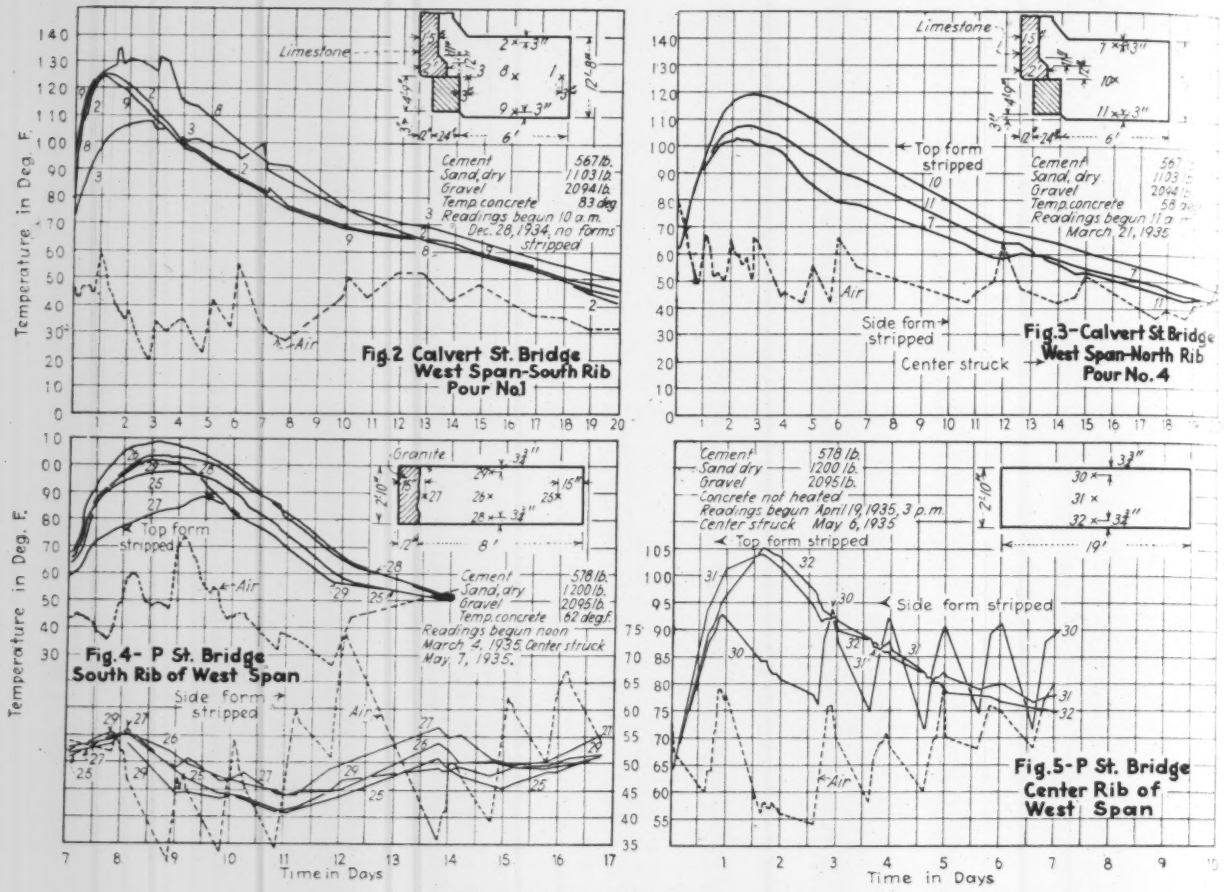

Limestone
Cement 567 lb.
Sand, dry 1103 lb.
Gravel 2094 lb.
Temp. concrete 83 deg
Readings begun 10 a.m. Dec. 28, 1934, no forms stripped
Air
Fig. 2 Calvert St. Bridge West Span-South Rib Pour No. 1
Top form stripped
Side form stripped
Center struck
Fig. 3-Calvert St Bridge West Span-North Rib Pour No. 4
Granite
Cement 578 lb.
Sand, dry 1200 lb.
Gravel 2095 lb.
Temp. concrete 62 deg. F.
Readings begun noon March 4, 1935 Center struck May 7, 1935.
Fig. 4- P St. Bridge South Rib of West Span
Concrete not heated
Readings begun April 19, 1935, 3 p.m.
Center struck May 6, 1935
Fig. 5-P St. Bridge Center Rib of West Span
Temperature in Deg. F.
Time in Days

FIG. 2—TEMPERATURE graphs and thermometer locations on ribs of concrete bridges in Washington.

and No. 2 coincided closely, No. 1 has been omitted for clarity. Except for the first 4 hr. due to the lag in covering No. 2, the average variation between No. 1 and No. 2 was 3.1 deg., with a maximum of 5.8 deg. Thermometer No. 3 was attached to a stone anchor which affected the temperatures. The maximum average rib temperature attained was 121 deg.

Fig. No. 3, Calvert St., shows the results in the second heaviest section. The average rib temperature reached a maximum of 109.4 deg. This section was poured at a slightly higher range of air temperature than was that in Fig. 1. It did not reach as high a temperature and returned and reacted to air temperature more rapidly.

Fig. 4, P St., shows readings on the smallest section observed. The average rib temperature reached a maximum of 98.9 deg. For the first 7 days readings on all thermometers are plotted. After that time No. 26 and No. 28 showed a variation of only 1.5 deg., and the latter has been omitted for clarity.

Fig. 5, P St., shows results on the third largest section. It was not practicable to take hourly readings on this section for an extended period and observations were stopped at the end of 7 days. Sixty-two readings were taken in this period, the average rib temperature reaching a maximum of 97.7 deg. Hourly readings were taken from 39 to 49 hr., and it is believed that the peak was recorded.

Thermometers at centers of sections would be expected to show the highest temperatures. It will be noted however that No. 32 (bottom) in Fig. 5 crosses and runs higher than No. 31 (center) between 1½ and 3 days, and follows it closely up to about 5 days. This is believed to reflect the insulating effect of the 3-in. lagging used in the soffit of this arch. Fig. 4 indicates a similar tendency in thermometer No. 28 though to a lesser degree since the narrower rib in this case has a lateral cover of concrete only slightly greater than the vertical.

In some of the key pours of the Calvert St. Bridge high early strength cement was used to facilitate striking of centers. One thermometer was placed in the center of one of these key pours. This instrument recorded a maximum temperature of 175.8 deg. (air 24 deg.) 16 hours after being covered, dropping

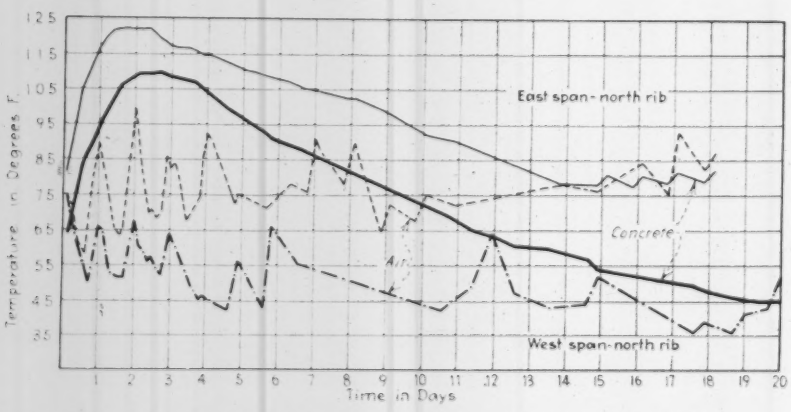


FIG. 6—CAMPARISON OF CONCRETE and air temperatures for pour No. 4 on the Calvert St. bridge.

uniformly in 5 days to 78.7 deg. (air 39 deg.) and in 7 days to 58.9 deg. (air 33 deg.) when readings were discontinued.

On three of the six sets of thermometers placed in the fourth pours in the Calvert St. Bridge (two in each span), it was not practicable to take extended readings, and on one set which was quite complete two of the thermometers showed some eccentric readings, probably due to damage to the waterproofing, and these results have been discarded.

In Fig. 6 are shown two sets of these readings which were the most complete and for which all conditions were identical except air temperatures. The lines marked "concrete" are the average rib temperatures which are seen to vary with the temperature of the air.

Temperature readings which were discarded were higher than those shown in Fig. 6 at a lower range of air temperatures. One of the three thermometers recorded a consistent curve and it is evident that the higher temperature attained was due to preheating of the concrete. The same tendency is indicated in the P St. results where the larger section (Fig. 5) at a higher range of air temperature did not quite reach as high a temperature as the smaller section which was preheated (Fig. 4). The key section using high-early-strength cement was also preheated and it is probable that the high maximum temperature recorded was partially due to the fact of this preheating.

Knowing the average rib temperatures for certain sections at different ages and the maximum to be expected in the key pours it was possible to estimate intelligently the average temperature of the arch rib and to regulate the pouring of the keys. As a result of the data obtained it was found desirable to delay the key pours on these bridges from 7 to 10 days.

A Reservoir Silting Case

FIG. 1 — NEUBERT SPRINGS DAM, washed out by recent highwaters, had collected 25,000 cu.yd. of silt in 15 years. The truck is refilling the washout.

FIG. 2—SILT FILLING OF POND as it looked after the flood discharge cut a channel through it. An older dam upstream, whose remains appear in the background of the picture, had collected about as much silt as the dam that failed.

NEUBERT SPRINGS DAM, a 15-ft. earth embankment built in 1921 to form a millpond of 2½ acres 7 miles south of Knoxville, Tenn., when washed out by a flood on March 24 was found to have accumulated silt in the 15 years of its existence to within about 2 ft. of pond level, or 85 per cent full. The deposit totaled about 25,000 cu.yd. or 15½ acre-feet—about 1 acre-foot of deposit per year, according to estimates made by engineers of the Tennessee Valley Authority.

Of the 1,100 acre drainage area, 40 per cent is in cultivated fields and grazing land, 60 per cent in sparse second-growth timber. Practically all the silt is believed to have come from the 440 acres under cultivation or in closely grazed pasture lands; if so, it represents a little less than ½-in. depth of soil removed. The silt immediately above the dam represents probably less than half the material brought down by the stream, however, since the remains of an older dam several hundred feet upstream caught a large part of the gravel and heavy material, leaving only the lighter soil to settle in the lake.

Winter Concreting

Studding and tarpaulin walls closed by a roof on jacks which lift it higher as building construction progresses upward protect concrete building workers

THE COMPLETE HOUSING of winter building, of which Canadian practice furnishes many notable examples, exhibited an interesting novelty in the construction last winter of a new factory near Toronto, Ont., for the Continental Can Company of Canada, Ltd. The factory is a three-story reinforced concrete building covering about an acre. The contract required construction to begin about the middle of January and to be completed April 15, putting a heavy concreting operation into the coldest months of an unusually severe Canadian winter. Frost protection thus became a controlling element of the building operations and it had to provide for continuous work by three shifts a day. Lighting therefore was necessary as well as heating.

Walls of canvas on studding were carried up about 10 ft. above the second floor outside the building walls. Over this enclosure the frame roof was built in four sections supported on columns or shores located at the center of each floor panel. Each shore footed on a jack. For the first story columns and second-floor slab the housing walls and roof were carried up to about 8 ft. above the second floor. These columns and floor slab being concreted, the roof was raised by the jacks a section at a time to cover a higher-walled enclosure, and the housing walls were carried up another lift. For each lift of the roof the jacks were transferred to the floor just previously concreted. About 400 supports were required for the four sections of roofs.

This arrangement served a number of purposes. The sturdy roof construction required to carry snow loads was possible without tall supports and much sway bracing; each roof section carried a permanent lighting system; only the volume of enclosure required for the concreting completed and actually in progress had to be heated, and no considerable height of light enclosure wall was exposed until it could be braced to the formwork, completed structure and roof.

Steam for heating was furnished at 90 lb. pressure from a central boiler to unit heaters located four above and eight below the slab being concreted. The steam pipe ran along the rear of the building in the space between the housing and the building and this space was used by the form carpenters. The heaters were of a type in which a fan forces air through the heated coils and into the space to be warmed. As arranged they kept the working space at 60 to 70 deg. with outside temperatures running about 15 deg.

About 6,500 cu.yd. of concrete had to be placed. The formwork was conventional except that plywood and fibreboard were used for beam and floor panels. These materials were found to hold the heat in the concrete as well as do boards of the usual thickness. The panels were also light to handle and gave surfaces which required less after-dressing. The concrete was delivered by truck mixers charged at a proportioning plant about a quarter of a mile away with aggregates at 50 deg. and water at 80 deg. The mixers delivered the concrete at about 70 deg., discharging into a ground level hopper; thence it went to hoist bucket, from hoist bucket to floor hopper and from floor hopper into buggies and to the forms. The concrete in the slab was vibrated with a gasoline surface-type vibrator. A guarantee of 2,000-lb. concrete was made, and it averaged about 2,800 lb. The slump was required not to exceed 3½ in.

The contractors for the work were the Austin Co. of Canada, Ltd. and the movable roof was designed by Albert S. Low, chief engineer.

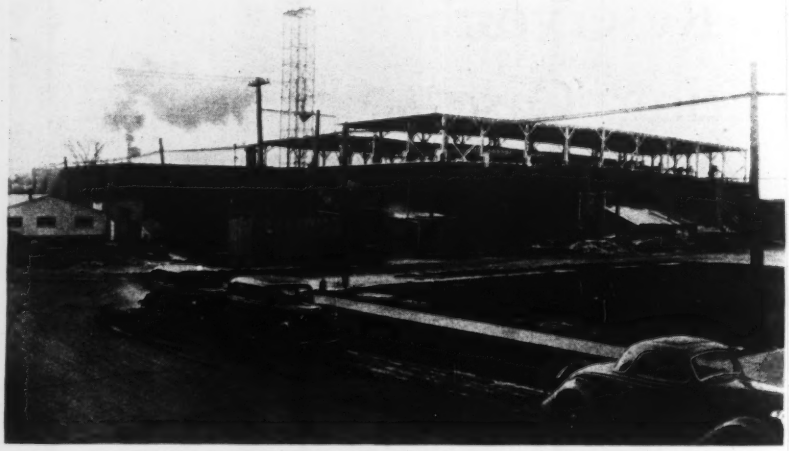
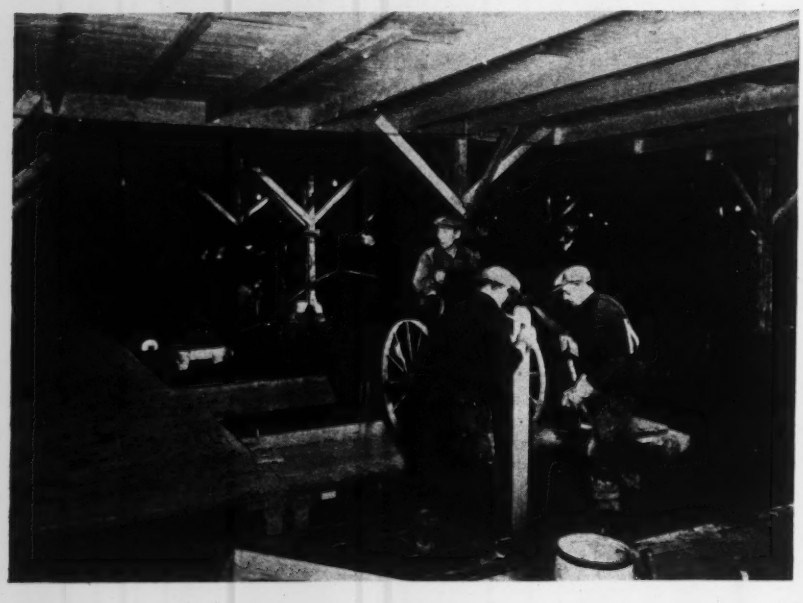


FIG. 1—INDUSTRIAL PLANT surrounded by weatherproofed inclosure with a movable roof, which is raised as work progresses. The roof at the right is at a height ready for the second floor inclosure, that in the center is being raised to this level while the roof over the left-hand portion is still at the level used in pouring the second floor.

FIG. 2—POURING CONCRETE for the first floor columns and second floor slab; note the roof framing and the vibrator at work on the floor slab.



A New Survey Era

Survey results have been given a new value by the creation of a standard plane coordinate system, which makes it possible to fix the geographic position of every survey by elementary methods

By Philip Kissam
Associate Professor of Civil Engineering, Princeton University, Princeton, N. J.

FEW ENGINEERS fully realize the importance of what has been done in the past few years through the creation of the state plane coordinate system. Coupled with a network of control traverses, the plane coordinate system, permits true geodetic location of any survey.

Professor Kissam who sponsored and, with the assistance of E. C. Wykoff, of the West Jersey Title and Trust Co., drafted the New Jersey law providing for the adoption of the plane coordinate system in that state, is thoroughly experienced in the application of the system there. His article illustrates the advantages inherent in the use of state plane coordinates, and points out how a new era in mapping and planning has been initiated. —EDITOR.

PRECISION and skill in surveying have continuously advanced, but the advance has been only to a small extent utilized in this country. Most surveys merely locate a given parcel in relation to surrounding parcels, but do not fix its geographical location. As a result the advantages of making every survey permanently valuable and coordinating it with every other survey in the same area have never been realized.

Lacking such correlation to geographic position, survey work results in much wasteful duplication of work, higher cost and lower precision. The lack of precision, in turn, leads often to legal difference and damage to land titles. Further, when broad-scale or detailed planning is necessary, the cost of surveys to obtain precise maps is usually so great that the plans are completed without proper information. If all surveys, regardless of size, were based on the same system of coordinates, an area map could quickly and easily be developed from prior data.

Up to the present time the only widely used coordinating element for maps and plans has been a common vertical datum, which has been found to be of practical importance wherever utilized. In but few localities are the other two dimensions based upon a common datum. Lack of primary control has been the retarding factor in the adoption of a common coordinate system.

A countrywide network created

The development of primary control in the United States has been the work of the U. S. Coast and Geodetic Survey, which for the past 100 years has been establishing a national triangulation net with arcs at 25-mi. intervals. By 1927 the work had progressed sufficiently to permit a comprehensive adjustment of the triangulation net; resulting in the establishment of the North American datum of 1927. About three years ago the Coast and Geodetic Survey was able to expand its personnel greatly by using relief funds, and thus to complete a large part of the triangulation net, making primary control available for more general use by engineers and surveyors.

The positions of the triangulation stations on this primary control are expressed in terms of spherical coordinates, that is, geodetic latitude and longitude. As computations of geographic position under such a system are laborious and unfamiliar to most engineers, it is not a practical method of expressing survey information except for large areas. The Coast and Geodetic Survey therefore established over the country a system of plane rectangular coordinates, which renders computation of position simple and rapid.

Because of the curvature of the earth, plane rectangular coordinates are only approximate. In order to maintain an accuracy of coordinate position in excess of the accuracy necessary for survey precision, and yet to cover as large an area as possible with each, a system of coordinates was established for each state. The shape and size of some states was such that two or more coordinate zones were necessary. In general, for states having the longest dimension east and west the Lambert Conformal Projection was used; for states having the longest dimension north and south the Transverse Mercator Projection, also conformal, was adopted. Mathematical considerations were taken into account, so that scale factors were kept within small predetermined limits. The coordinates for each state are all plus, the north coordinates being given the designation "*y*" and the east coordinates the designation "*x*," and both coordinates are expressed in feet and hundredths.

This system permits of computing the plane coordinates of every station in the national triangulation net, which work is now being done by the Coast and Geodetic Survey as rapidly as conditions permit. It is possible to base a survey on two or more of these stations and, by the usual computation of latitudes and departures, to determine the standard coordinates of every survey point. Immediate check of the work is obtained, and results are coordinated automatically with any other work run in the same manner. No knowledge of the use of geographic positions is necessary, nor are any geodetic considerations utilized.

State control surveys

The second step in this development was the establishment of state control surveys carried out with CWA funds. The survey organizations set monumented points and connected them by traverse to existing triangulation stations. Through these surveys, conveniently located control points have been established at intervals of two miles or less. At the cessation of CWA activities, the Federal Emergency Relief Administration took up the work, which is now being continued in fourteen states under the Works Progress Administration.

This control is important in property surveys because, once the true coordinates of the corners are determined, the positions of the corners can never be lost, as the entire net will provide witness marks for them. Properties described from the control net can be compared with adjoining parcels of land to determine whether they adjoin, overlap, or are separated by gores. It is also possible to determine easily whether sufficient land exists for the properties in question. Title searching and the compilation of mosaics are eliminated. Points of beginning are definite, reducing the work to a matter of skill rather than judgment, thus eliminating the chief cause of property disputes.

In order to bring about more general acceptance of such a system, various state legislatures are considering the adoption of bills describing the standard projections to be used for reference in title deeds and legalizing the use of standard coordinates in property descriptions. Such a bill has already become a law in New Jersey (Ch. 116, P. L. 1935). The law defines as official survey base the New Jersey system of plane coordinates, a transverse mercator projection of Clarke's Speroid of 1866, having a central meridian of 74 deg. 40 min. west of Greenwich.

More extensive use of the plane coordinate system is also being fostered by the Federal Board of Surveys and Maps, composed of 24 federal agencies engaged in surveying or mapping, which is considering the following recommendations:

> It is recommended that the Federal Board of Surveys and Maps strongly advise all its member organizations to adopt the systems of plane coordinates devised by the Coast and Geodetic Survey for the various states, and use these systems of plane coordinates as bases for all of their surveys and maps which do not, because of their nature or extent, require the use of geographic coordinates.
>
> It is further recommended that an

auxiliary projection showing the appropriate state plane coordinate system be placed on all maps and charts which, because of their nature or extent, require a geographic base, but which may have value and use for engineering purposes.

Practical application

The advantages of position determination of all surveys are apparent. If a state built a new highway, the center line of which was indicated upon the state plane coordinate system, the road could immediately be plotted upon Geological Survey maps without recourse to field work. Construction of any federal project would likewise be ready for mapping at the completion of the survey. Private engineers called into army service would be entirely familiar with the coordinate system employed by the army for mapping work, and in general, any survey work done by one of the 24 members of the board, or by any other agency, and expressed upon the plane coordinate system, would be available to all.

It is well recognized that extensive planning is becoming an immediate need for the development of the nation. The loss in fertility of agricultural lands, the increasing intensity of droughts, the chaotic development of oil resources, the mounting damage from floods, and the loss in value of real estate which has been improperly developed, show that such control and correlation is not a visionary objective requirement, but a vital present necessity. Unfortunately, it is often impossible to make proper plans. Either the required information has never been instrumentally determined or the information can be gathered only from a wide variety of existing surveys. New surveys take too long to be of use when an emergency situation arises and compilation of existing data into a comprehensive map is quite often an impossible task.

An illustration of the difficulty of compiling such disconnected surveys can be found in the study of the Mississippi River Valley for flood control. At the time this study was first desired so few pertinent maps existed that it was necessary to requisition data from every source. The resulting information presented such confusion that it was impossible to complete the task of arranging all of it in time to serve as a basis for the required report. Had the surveys from which these data were obtained been based upon a standard datum, true maps could have been compiled quickly.

The Tennessee Valley case

Often an engineering emergency arises which requires immediately data that have never been obtained. For example, when the Tennessee Valley Authority began its work, extreme efforts were made to obtain maps. The area could be flown quickly enough and planimetric maps developed without too much delay, but there was no secondary control. If even only highway surveys in the area had been on a standard datum, the project would not have been delayed while the Geological Survey, the Tennessee Local Control Survey, the Coast and Geodetic Survey and the Tennessee Valley Authority cooperated to produce secondary control for the project. If the property surveys alone had been on a standard datum, secondary control would have existed sufficient to allow quick mapping of the area.

These examples illustrate a condition prevalent in every state and municipality. The lack of correlation makes existing data unusable, or the lack of secondary control makes quick determination of the data impossible.

The importance of a standard datum in the Tennessee Valley when once it had been established is shown in a letter from George D. Whitmore, Chief of Surveys, Engineering Service Division, Tennessee Valley Authority, who states:

> All of our property acquisition surveys and maps are now based on the state plane coordinates; all silt ranges for measuring silt deposits in existing and future reservoirs are preserved for future recovery and remeasurement; tracts of property transferred from the Tennessee Valley Authority for the use of other government agencies are now being described by state plane coordinates.
>
> Their greatest immediate use will be, however, in describing for public record the total block of land which the government will own in each reservoir area. Norris Reservoir in Tennessee, comprising about 140,000 acres; Wheeler Reservoir in Alabama, comprising about 10,000 acres; and Pickwick Reservoir in Tennessee, Alabama and Mississippi, comprising about 65,000 acres. In the first two reservoirs, the land-buying program is so nearly complete that we are already at work monumenting, measuring and coordinating the outer boundary of government-owned land. A detailed, large-scale plat of land owned by the government in each county will then be prepared and filed for public record in the county seat of each county. These plats will show the locations of all monuments, the state plane coordinates of such monuments, and the azimuths and distances of the boundary courses of the state coordinate system. Incidentally, in making these boundary surveys, we place a concrete monument with a small bronze tablet inscribed "U. S. TVA Property Marker" at every angle point.

Integration of data necessary

It is evident that means must be found for the integration of all surveying data, whether gathered by federal, state, county, municipal, industrial or private engineers. The only way in which to achieve this integration is for all surveyors to base their work on a standard horizontal datum, with the same regularity that characterizes their use of benchmarks in running level lines. The adoption of state laws, similar to the New Jersey law, would in all probability expedite the general use of the plane coordinate system.

Current Land-Drainage Research

RESEARCH PROJECTS in land drainage are at present a leading object of attention by the U. S. Department of Agriculture, according to a paper by Lewis A. Jones, chief of the division of drainage, Bureau of Agricultural Engineering, presented at the recent annual meeting of the Illinois Society of Engineers.

Cooperative investigations with the Minnesota Department of Conservation and the University of Minnesota are being continued to determine the factors that influence the permanency of underdrains, because of failures of the material used as the result of chemical and frost action.

At the hydraulic laboratory of the University of Iowa cooperative investigations are under way relating to the flow of water around bends. Investigations are planned to develop the theory of the hydraulic jump on sloping floors, as such information would be of value in the design of spillways and structures for discharging lateral drains into main outlet channels.

In Florida studies are being made to determine the optimum depth of drainage for different crops in peat and muck soils and the means and cost of maintaining these depths. There are more than 3,400,000 acres of peat and muck soils in Florida, mostly in the Everglades section, but to be suitable for cultivation they must be protected by levees against overflow and be drained by pumping. Maintenance of the groundwater table at a fairly uniform depth is more important in these soils than in the finer loam and clay soils.

In southern Louisiana an investigation is under way to determine the most advantageous depth and spacing of drains for sugarcane land, and the effect of drainage upon yield of cane and sugar. To date, good surface drainage with underdrainage 2.5 to 3 ft. deep has given as good results as deeper drainage.

Runoff investigations are being continued on two small watersheds in Iowa. In northern Minnesota, studies are being made to determine the relation of groundwater table to drainage. It is expected that the data will indicate whether or not the groundwater table has been materially affected by drainage works, or whether the fluctuations are due primarily to deficiency in rainfall.

Brick Veneer Holds Tight

Eight years' service shows leaching on brick surface but no peeling or structural failure of the brick facing on Caneadea Dam

EIGHT YEARS AGO when face disintegration of concrete dams was arousing a flurry of comment the engineers of the Rochester Gas & Electric Corp. decided to forestall such an eventuality by facing with vitrified paving brick its new high concrete arch dam on Caneadea Creek. A full description of the dam was published in *Engineering News-Record*, Aug. 23, 1928; it had been completed in April, 1928.

The dam is a constant-angle arch, with a radius of 262 ft., sprung between gravity-section abutments. It is 140 ft. high above streambed, has a maximum bottom thickness at the middle of 44 ft. and a crest thickness of 5 ft. below the walk. It was concreted in eleven 40-ft. segments for a total arch length of 440 ft. Expansion joints were provided between segments; these joints were repeated in the brick veneer which covers both faces of the dam. This brickwork was laid up in mortar in alternate columns of headers and stretchers (Fig. 3) and in 5-ft. lifts against light forms. The brick facing had thus a construction joint every 5 ft. in height besides the expansion joints every 40 ft. of arc. The mortar in the brick walls was allowed to set 24 hr., and then the space between them was filled with concrete. After the forms were down the brickwork was pointed up but quite roughly by common laborers and not by masons.

It is important to note that in the design of this dam the concrete alone was regarded as the working structure and the brick as a mere integument cloaking protecting the body of concrete. The designers had two purposes in mind in adopting such protection; one was to guard the concrete from disintegration by frost and the other was to make the dam tight against water. Incidentally the brick facing reduced the cost of forms. The bond of the facing to the body of the dam depended wholly on the adhesion of the concrete and the keys formed by the vertical bands of header brick.

Interest in the behavior of this unusual construction prompted inquiry of the Rochester Gas & Electric Co. and E. R. Crofts, superintendent of electrical operations, submitted in reply the accompanying views taken in April, 1936, eight years to the month after the dam was completed. The brick surface is blotched by leaching from some of the construction joints and some of the expansion joints show surface spalling of the brick. In no place is there structural failure of the facing or loosening of the bond between it and the concrete.

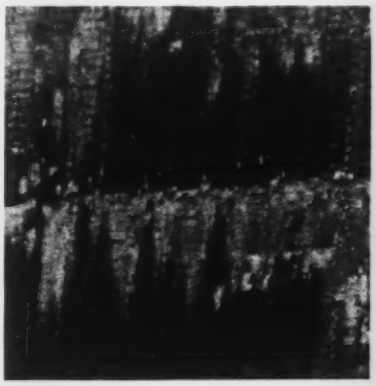


FIG. 2—CONSTRUCTION joint where the leaching is particularly bad but is unaccompanied by structural damage.

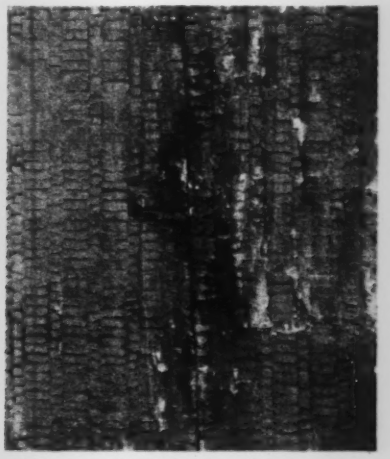


FIG. 3—EXPANSION joint showing some spalling of the brick but no loss of integrity of the surfacing.

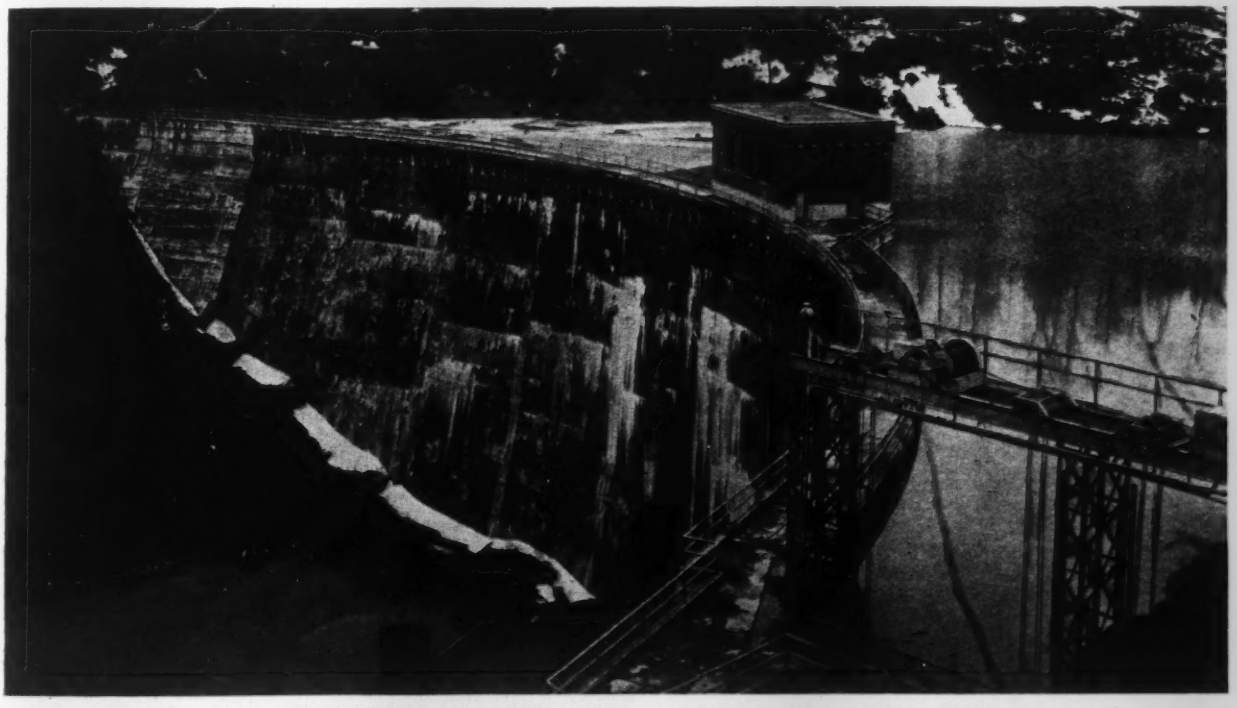


FIG. 1—BRICK FACING of Caneadea Creek dam, structurally intact, eight years after completion.

Half-Ton, "Leaping Lena" Compacts Earthfill on Dam

Explosions from a gasoline engine lift the tamper off the ground and an inclined bottom causes it to move forward as well as upward in its leap

By Paul Baumann
Junior Assistant Chief Engineer, Los Angeles County Flood Control District

A POWER-DRIVEN tamper weighing about half a ton has been imported from Germany and put to work in March on San Gabriel Dam No. 1 under construction by the Los Angeles County Flood Control District. Essentially, the device is a four-cycle, single-cylinder combustion engine with very simple mechanical features designed to lift the device bodily by utilizing the energy generated in the explosions. The tamper can be operated so there will be about 50 explosions per minute and thus can deliver blows at this rate to the surface to be compacted. Similar tampers have been used for a year or more on the dikes of Holland. On San Gabriel Dam, material in zone 2 varies from a finely decomposed granite to a sandy loam with occasional rock up to 5 in. in diameter. On this material highly effective work is being done by the tamper, formally called the Delmag Frog, but popularly known on the job as "leaping Lena." It is manufactured by the Delmag Company in Esslingen, Germany.

The device is in the shape of a heavily built truncated cone to the top of which handlebars and a gasoline tank are attached. The handlebars are used by the operator to control and guide the frog as it works. Supplementary electrical apparatus consisting of dry cell batteries and ignition coil is carried in a knapsack-like outfit on the operator's back, thus protecting it from the shocks it would get if mounted on the tamper. Explosions of the gas mixture do not occur automatically but are produced separately by a pushbutton contact on the right handlebar convenient to the operator's right thumb. The bottom of the tamper, which is 30 in. in diameter, slants slightly away from the operator so that as the frog leaps upward it also moves forward. The average height of a jump is about 9 in. and the forward movement at each jump is about the same.

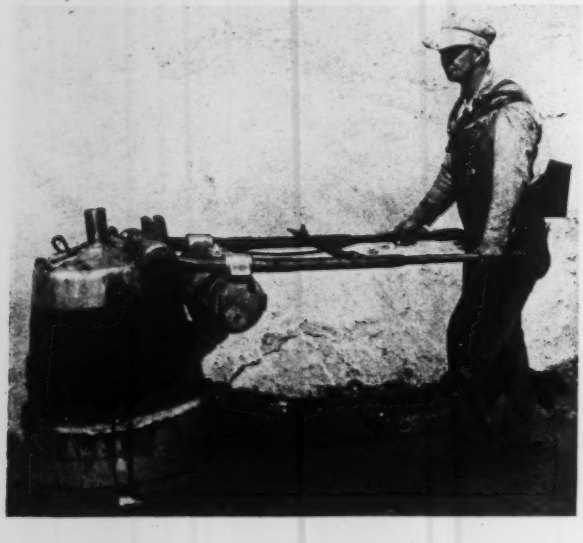
The device is started by compressing the piston spring by means of a lever inserted in the piston stem which protrudes from the top of the tamper. This lever raises the piston by several successive 3-in. lifts, compressing an internal spring and at the same time compressing a mixture of gas and air within the combustion chamber. When the operator presses the spark button which is conveniently located on the right handle bar, the gas mixture explodes, lifting the upper part of the tamper from the base and thus going through the first cycle or power stroke in the course of which the piston spring is stretched. The second cycle, which results from the contraction of the spring stretched during the power stroke, pulls the base upward off the ground and at the same time fulfills the function of a scavenging stroke, exhausting the waste gases. After full contraction the spring again expands in a reaction which produces suction in the cylinder; i.e., the third cycle which sucks in a fresh gas mixture.

The relation of weight to spring strength has been arranged so that simultaneously with the end of the third cycle the tamper strikes the ground heavily. At the same time that it delivers this blow, inertia coupled with the impact causes maximum compression of the explosive gases in the combustion chamber, thus completing the fourth cycle and putting the device in readiness for the next ignition spark. The operator has to learn to observe the cyclic positions of the tamper so he can time the explosions correctly. This is not difficult and can be learned quickly by an intelligent laborer.

It has been found preferable to use aviation gasoline of which about 2 qt. is required for each hour of operation. The 2-gal. tank mounted on the handlebars usually suffices for half a day's operation without stopping to refuel.

Experience with the tamper on this job indicates that average performance is an area of about 3,000 sq.ft. compacted per hour of operation. The tamper can be used to compact material along the contact lines with the abutments and cutoff wall. With about a 9-in. layer of freshly spread material weighing about 90 lb. (dry) per cu.ft., a single trip of the tamper gives a degree of compacting such that the dry weight will average about 115 lb. per cu.ft. On this job ordinarily only one trip is made over each 9-in. layer to be compacted. The manufacturer claims that after making three trips over sand fills spread 2½ to 3 ft. thick, the resultant compaction has been found to equal that 13 ft. below the surface in the original water-laid deposit.

FROGLIKE hops move this strange device over the fill of San Gabriel Dam No. 1. With the ignition system on his back and a push button under his thumb on the handlebars, the operator puts the half ton machine through its paces.



Employing Labor Under Federal Rules

All the procedure and regulations should be learned before a contractor prepares a bid for any kind of work

By James H. Campion
Chester, Pa.

VIRTUALLY all contractors who do federal construction must employ labor from sources specified by the federal government and work it under restrictions set by federal bureaus. Federal works divide into four groups:

1. Public Works Administration projects being paid for in part by money appropriated under the N.I.R.A. Act of 1933 (PWA Title II)
2. Public Works Administration projects being paid for in part by money appropriated under the Appropriation Act of 1935 (PWA New).
3. Bureau of Public Roads jobs being paid for in part by money appropriated from the Appropriation Act of 1935 (W.P.H. and W.P.G. Jobs).
4. Work being contracted for by other agencies of the government such as war department and navy department.

It is with the rules and regulations of labor employment in connection with the last three groups that I wish mainly to deal but I will touch lightly on Group 1 so as to make clear its distinction from Groups 2, 3 and 4.

Regulations as set by law and fiat

Contractors are generally familiar with regulations regarding contracts in Group 1. Briefly, these contracts are advertised and awarded by the sponsoring agents. They specify the designated employment service from which the contractor shall requisition men. Qualified veterans with dependents are to be given preference in referral—no relief status is required. The contractor is allowed to designate men in supervisory and key positions. Work is limited to 30 hr. per week excepting in special instances where 130 hr. per month is allowed.

In Group 2 all contracts are under the supervision of the Public Works Administration. The greater part of this work is building contracts and most of this construction is school houses. In Pennsylvania there is a $40,000,000 program of this type of work which embraces about 382 school buildings. The contracts for this type of work require that 90 per cent of the labor employed be certified by the relief boards as eligible for employment. This means that to be eligible the people must be on relief or have been on relief between May, 1935, and January 15, 1936. The contractor is allowed to predesignate men in supervisory and key positions but is required to confine such choices within the 10 per cent non-relief allowance.

In Group 3, the projects are mainly highways and grade crossings. They are under the direct supervision of the Bureau of Public Roads and carry the provision that 90 per cent of the labor employed shall be certified relief eligibles. On this type of contract the contractor may predesignate men in supervisory, key and highly skilled positions.

In Group 4, the projects are under the supervision of the government agency advertising and awarding the work. The 90 per cent relief status for employables is required. The predesignations in supervisory and key positions are allowed and these are generally indicated and made a part of the contract.

The Works Progress Administration (WPA) is charged with the coordinating of the construction program where all projects in Groups 2, 3 and 4 regulations provide that all projects under contract or projects being prosecuted by other governmental agencies take precedence over WPA-operated projects in the assignment of labor. WPA is specifically charged with seeing that the largest percentage of relief eligibles attainable are employed on these projects. They are charged not to advertise nor to allow contracts to be awarded unless there is relief labor available in required amounts to man these projects.

When an award is entered into WPA is definitely committed to furnish the required relief labor or else grant exceptions to the contractor so he may secure non-relief labor through designated channels. Further, federal works progress administrator Harry Hopkins has issued to his state administrators an order stating that in the event the contractor does not receive action on his requisitions for labor in four days (and it has been established there is no relief labor available for his job) non-relief labor shall be automatically referred by the designated referring agency.

How the regulations should work

Now all this reads well but let us try and figure what constitutes action on the part of the WPA authority and how long it takes to establish the fact that there is no relief labor available. To do this, let me outline the procedure, which is subject to change at any time, that is set up in Pennsylvania to handle labor requisitions.

When a contract is awarded for any job in Group 2 or 3, the contractor must immediately file with the WPA Form 303. This form proposes to show the plan of job operations and the number of men needed from week to week to prosecute the plan. This form is supposed to enable the employment service and the WPA cooperating, to plan to supply labor as needed. You know you put four eggs away to bake a cake on Tuesday and a quart of milk to sour so you can make biscuits on Friday or something like that—the contractors will have to figure this one out.

Ten days or so before the contractor is ready to start work he submits a requisition for his initial requirements on a Form 401. In the case of Group 2, these requisitions go in duplicate, first to the WPA which forwards a copy to the designated employment service. WPA, in this instance, O.K.'s the requisition as to allowable predesignations in the supervisory and key positions.

In the case of Group 3 contracts, the requisitions come first to the employment service and a copy is sent to the WPA authority. This is done because, as I have explained, on the projects in this group a contractor can predesignate supervisory, key and skilled men.

The following referral procedure has been set up in the state of Pennsylvania and while other states may not follow this particular procedure in detail, the rules and regulations regarding the referral of men to these projects will necessitate a similar procedure in other states.

When a requisition is received for projects requiring relief status for referral, the referring agency has three sources from which to refer. They are:

1. The referring agency must call upon the WPA authority to obtain men who are working on WPA-operated projects.
2. They next refer those persons who have once been referred to WPA operated projects and who have been released and not re-assigned by WPA to other WPA-operated projects.
3. To refer qualified people who have been certified as eligible for this particular work and who have never been assigned to any work under the program.

The referring agency prepares a list of men who are working on WPA projects within reasonable distance of the contractor's job. On receipt of this list the WPA indicates whether these men are available and can be released to the contractor. While regulations state that the WPA must give the contractors' jobs precedence over their own, the statement is clarified by saying that the WPA cannot shut down their own operated projects if by so doing an economic loss is incurred, danger to the public, etc.

When men are referred to the contractor on his requisition he is furnished a referral sheet listing the names of the

men so referred. For each man referred a 325, Assignment and Identification Slip, is made up in sextuplicate. One copy of this form is sent to the man referred and the other five copies are sent to the contractor. If the man referred reports to the contractor and is hired, he signs all copies of the 325 Form which are also signed by the contractor's representative. The contractor keeps one copy of this form to substantiate his payroll and the other copies are returned to the referring agency. In case the man reports and is not hired, the 325 form is marked "Rejected"; if he does not report for work it is marked "Did Not Report" and all copies returned in the same manner to the referring agency.

The contractor separates a man from work—he is required to fill out a Form No. 403 and send that immediately to the referring agency. If a man's classification and wage rate is changed while on the job, a Form No. 404 is made out and sent to the referring agency.

The matter of preparation of payrolls, special reports, etc., need not be touched upon but it is sufficient to say that a great deal of paper work involves upon the contractor's timekeeper in order to keep things in shape.

Qualifications now appear

Outside of all the procedure involved in obtaining men for a job and all the forms and paper work, etc., that the contractor must take care of, it appears on the surface that there are eleven million unemployed in the country and that a contractor, after due delay, might finally man his job but there are other considerations that may make this a difficult proposition.

Outside of large centers of population such as Philadelphia and Pittsburgh, the majority of eligible relief labor is employed on WPA-operated projects and it will be necessary to release a great number of these men in order for the contractor to obtain sufficient labor. In the matter of men in skilled positions, this probably will not be difficult because if a man is working on a WPA-operated project as a laborer and he is a qualified carpenter, there is no doubt that he will give up his position on the WPA project in order to take a job in his classification as carpenter with the contractor because in this instance, he will probably be improving his condition and can make more money, but in the classification of intermediate and unskilled labor it is going to be difficult to secure men in a great many localities in Pennsylvania. The reason is that men employed on WPA-operated projects are being paid a monthly wage. Because of the activity of unemployment groups throughout the state the security wage although it is designated as such, has been increased until, in a great many instances, it is equal to or a little above the prevailing wage rates. This is particularly true when you figure that on these WPA.-operated projects men do not lose any time and that they are paid practically on a monthly basis. They realize that in working for a contractor their time may be curtailed and only under favorable weather conditions will they be able to work the full time allowed.

Typical procedure

As a concrete example: In the Philadelphia area the security wage for labor is $60.50 per month. The prevailing wage for labor was $0.50 per hour. A man on a contractor's job would have to make his full 120 hours a month in order to equal the wages paid by the WPA on their operated projects. Besides this feature, there is no doubt that labor will be required to produce a whole lot more on the contractor's job than it has to produce on the WPA-operated jobs.

For a time the WPA authority left it entirely up to the man working for them as to whether or not he would accept a job with the contractor. If he did not choose to go to work for a contractor after being referred to him, he need not and he would continue to work for WPA. Further, under the rules and regulations the WPA authority has been charged to keep men assigned to them for work in employment for a year. The men at work on these projects are well aware of all these conditions and it is going to be hard for a contractor to obtain the men in the intermediate and unskilled classifications.

Men are now being informed they must accept work on public works contracts when it is offered to them unless they have a valid reason why they should not. These reasons can be many.

When these men are forced to accept work on contract jobs at a lower rate of pay and more exacting conditions of employment, they are disgruntled and dissatisfied. Some will, no doubt, do everything they can to be fired, because they can then go back to WPA jobs.

Conclusion and warning

In other words, in spite of the fact that the regulations say that the contractor's job shall take precedence over WPA-operated jobs he is still in competition with these jobs for men in the lower brackets.

Comparison of rates

It behooves him to study thoroughly the labor situation in the community where he proposes to bid work because he may have to pay more than the prevailing rate of wages in order to secure men and because, under the 30-hour-a-week rule, it is going to be a hard thing for him to give men the maximum number of hours per month they can work.

In checking over payrolls of PWA Title II work last year in Pennsylvania, laborers on highway work very seldom averaged over $9 or $10 a week during a construction season.

While at the present time there are provisions for exemptions to be made so the contractor can hire non-relief labor for his jobs, it has not been definitely settled just how quickly these exemptions can be obtained. In view of the fact that the WPA administrators in the various states are charged with the responsibility of getting all relief labor that they possibly can on the contractors' jobs, it is certain that there will be many delays before it is established that there are no relief eligibles available anywhere for the contractor's project.

This matter of regulations regarding employment of relief eligibles on the types of projects described is of paramount importance to the contractor and he should investigate all conditions in connection with the supplying of labor to the ojb he proposes to bid. He should contact the local employment service, the works progress administrator, and thoroughly acquaint himself with all the procedure and regulations before thinking of preparing an estimate for any type of work.

There has been a certain amount of work already advertised and awarded in Pennsylvania and the greatest part of it has been taken too cheaply and I am sure that contractors have not investigated nor estimated what these rules and regulations regarding employment on their jobs means to them in dollars and cents.

Sections of Oregon Reclamation Projects To Be Opened for Homesteading

SECTIONS of the Vale and Owyhee reclamation projects in Oregon will be opened for homesteading in May. A total of 1,021 acres, in 27 units, will be opened on the Vale project May 15, while 107 farm units totaling 6,289 acres will be opened on the Mitchell Butte division of the Owyhee project on May 16.

Construction on both these projects was begun five years ago and they are now being brought to completion. Water has been delivered to some lands on these projects prior to this time but only with completion of canals during the last few months has it been possible to bring sufficient water to the lands. Since 1924 the Bureau of Reclamation has opened a total of 86,395 irrigable acres, exclusive of the two openings to be made on the Owyhee and Vale projects.

With the completion of work now under way a total of about 390,000 acres of new land will be irrigated by the Bureau during the next ten years.

Foreign Countries Lead U. S. in Welded Bridges

A review of European accomplishments of the last five years reveals many structures that have no counterparts as yet in American practice.

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Topeka, Kansas

PROGRESS in the application of arc welding to industrial work has become so extensive and so far advanced in the United States that this country leads all others in the use of this process for mechanical equipment, boilers, containers, piping and chemical equipment. The advancement in the field of structural engineering on the other hand, and particularly in bridge construction, has not been so outstanding as in several foreign countries.

Our wide acceptance of welding in industry rests on the better control and training that can be maintained in manufacturing shop or mill as compared with a construction operation; and it is also largely a result of our mass production practices. Also, it is relatively easy in plants to provide for annealing or stress relieving, to correct the physical and metallurgical damage created by very high speed welding processes and to provide for the detection of defects by such means as the X-ray.

These considerations of course, are present in foreign countries, so that the greater utilization of welding in structural applications in these countries is the more notable. The present article brings together descriptions of the more important welded bridges, in some cases accompanied by brief analytical comments in the light of the author's experience with welding. The countries considered include, Belgium, Germany, Great Britain, Poland, France, Czechoslovakia, Holland, Italy, Russia and Sweden.

The Belgium record

Many outstanding welded bridges have been constructed in Belgium, and a group of twenty-four Vierendeel truss bridges with span lengths as great as 223 ft., which are tabulated in *Engineering News-Record*, July 25, 1935, are most notable. Most of these span the Albert Canal, being constructed between Liege and Antwerp.

The first welded bridge in Belgium was contracted for in September, 1931. It is a 223-ft. Vierendeel truss span at Lanaye, and a 33-ft. through girder approach span is rigidly attached to it at each end. The roadway is 19.7 ft. and there are two 5-ft. sidewalks. The structure is designed for two 35-ton trucks. The top chords of the trusses are parabolic with floorbeams both at are twelve panels of 18.5 ft. with floor beams both at the panel points and at mid-panel. A full upper lateral system is used. The total weight of structural steel is 374 tons.

The top chords and the approach span girders are I-sections, built up from flat plates. Between the large radius gusseted connections, the bottom chords and posts are rolled beams. The posts are stiffened by out-riggers.

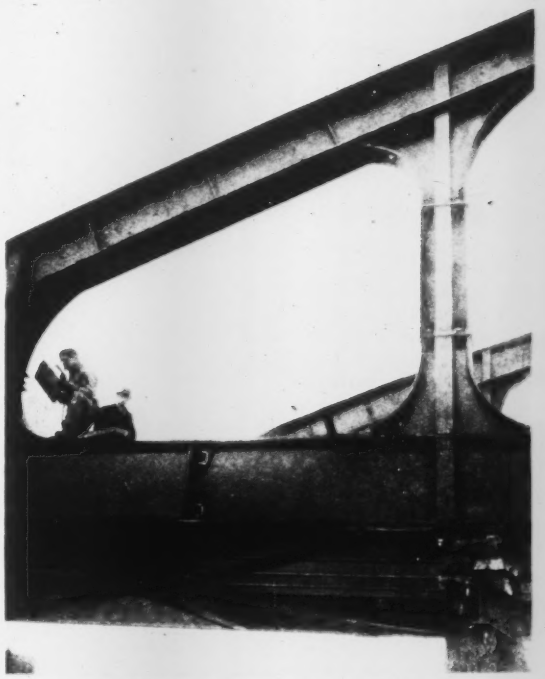


FIG. 1—WELDING a post connection in the first all-welded bridge in Belgium, a Vierendeel truss of 188-ft. span known as Highway Bridge C of Herenthals. The fillet welded interposed plate connections are convenient for erection but not as efficient as butt welded joints.

The only exceptions to welded construction on this bridge are the field joints between the posts and the gussets of the top and bottom chords. These joints are field riveted, as is the case with five other bridges of this series, because it was not at the time realized that field welding would prove to be reliable and more economical. The Lanaye bridge was the largest welded bridge in the world at the time of its completion in May, 1933.

The first all-welded bridge in Belgium, known as Bridge C at Herenthals, was constructed in 1932. Its central 188-ft. Vierendeel truss span is flanked by a 57.5-ft. through girder approach span rigidly connected to the trusses at each end and provided with a hinge 9.8 ft. from the pier.

Both the method of assembly and the details of the members were changed extensively from those employed at Lanaye, a considerable amount of research and study having been conducted during the intervening year. The chord sections are of the same type, but in lieu of providing an upper lateral system and outrigger braces for the posts, the cross sections of the built-up vertical members are made in the shape of a cross, and they form the sides of rigid frames, to act as transverse bracing at each panel point, completed by the floorbeams, which are provided only at the panel points, and by overhead struts, used where vertical clearance permits.

A large amount of shop welding was required, especially at the gusseted joints. Very careful and intelligent control was necessary, to avoid warping, distortion and high shrinkage stresses. All of the welded field connections, other than those for the six lines of stringers that are welded directly to the floorbeam webs, are made by interposing a plate at right angles to the axis of the member at each field joint, except that the floorbeams are welded in the field to inclined interposed plates that are shop welded to stub ends extending out from the trusses at each panel point, Fig. 3. The interposed plates are in general fillet welded in the shop to the lower of the two sections joined, with reference to their erected positions, so that nearly all the field welding consists of fillet welds made in the flat position. Triangular stiffening plates are provided just above and below the ends of the stringers, welded to them and to the webs of the floorbeams, to stiffen the stringer connections. Anchor plates are welded to the tops of the stringers, to bond them to the floor slab. The bridge as built involves 20 per cent less weight of steel than the alternative riveted design.

Although the use of interposed plates is quite economical and also facilitates erection, recent research work has indicated that this type of connection does not resist fatigue very well. Furthermore, uncertainty is involved due to the fact that occasionally one finds laminations in rolled plates and shapes, and

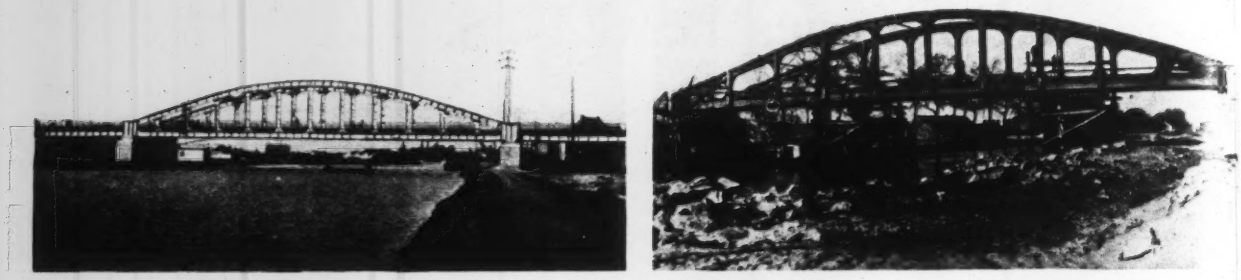


FIG. 2—TWO of Belgium's welded bridges. The combined highway and railway bridge, 40 N of Schooten over the Albert Canal (left) utilizes a full upper lateral system and field riveted joists, while the Kempen Canal bridge (right), one of nine identical structures, used no overhead bracing and is entirely welded.

because the properties of steel in the direction of its thickness are not very well known.

The two bridges, 39N and 40N of Schooten near Antwerp, identical in design and carrying both highway and electric railway traffic, were constructed in 1933 prior to the adoption of field welding. However, it was convenient to fabricate the bridge chords in very long sections weighing 11 to 16½ tons each, thereby holding the field riveting to a minimum.

Each bridge consisting of a central 207-ft. Vierendeel truss span with parabolic top chord, and a deck plate-girder approach span of 54.5 ft. at each end. The central truss span is divided into 12 panels with six field joints in each chord. Either one or two field riveted joints are provided in each post, depending upon the height of post, which is 28.2 ft. at the center of the bridge. There are six panels of upper laterals, a heavy overhead strut acting with the posts and floorbeams as a rigid frame portal at each end of the lateral system.

The chords as well as the posts are of I-section built up from flat plates joined by fillet welds. Floorbeams are of built-up I-sections. Six lines of rolled beam stringers are used, four under the roadway and one under each sidewalk. The approach spans are supported by two main girders of built-up welded I-sections 53 in. deep, with floorbeams spaced at 14-ft. centers. The roadway is 20 ft. and there are two 5 ft. sidewalks.

The best shape and details for the gusseted connections and field joints were determined from laboratory investigations. Tests under repeated loading proved that without a doubt the butt welded joint, which has been adopted for all future projects, is greatly superior to all others and that the joint with longitudinal welded cover plates is the poorest, with the possible exception of the joint with interposed plates.

A Welded Swing Bridge—An unusual example of the use of welded Vierendeel trusses is the 117-ft. swing bridge constructed in 1932 at Ghent (Muide), Belgium, providing a 71.5 ft. span over the navigable channel on one side of the pivot pier. This structure was designed for two tramway lines in the 20-ft. roadway and carries two 3-ft. sidewalks. The rigidity of a welded truss of this type is particularly desirable for a swing bridge, to facilitate speed of operation and the accurate alignment that must be maintained, to permit locking and unlocking.

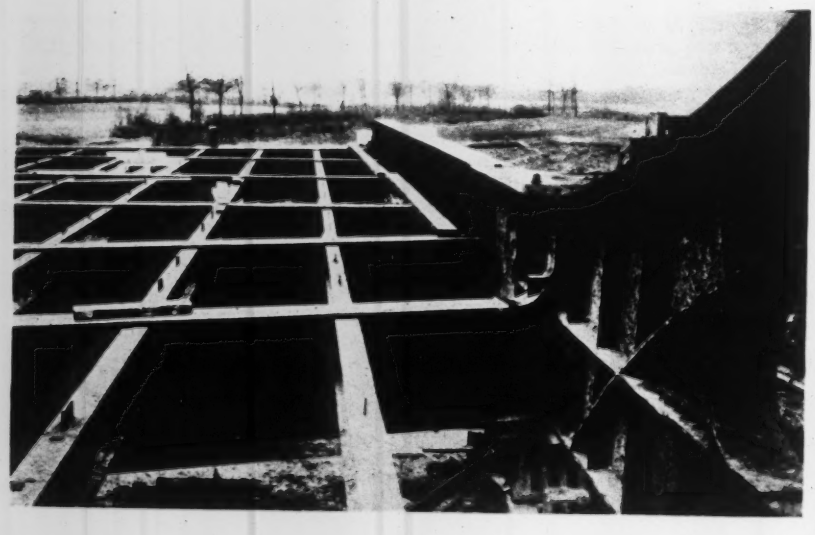
In Fig. 4 are shown a few of the typical details of a series of five identical bridges of 200-ft. central span length with 55-ft. approach spans, each involving 343 tons of steel, that were designed last year by the Belgian Administration of Bridges and Highways for immediate construction over the Albert Canal. They represent the current design practice.

In some of the later types of construction, the top chords are composed of two rolled beams joined by a web plate to provide greater lateral stiffness, and the overhead struts and upper lateral system are omitted for better appearance. This construction is illustrated in Fig. 2 as used for a series of nine identical bridges constructed over the Kempen Canal, each of 149-ft. span length and involving 145 tons of steel.

Welding and Vierendeel trusses are considered a natural combination from the standpoint of economy, esthetics and technical design. Recent awards of contracts have brought the total number of these welded Vierendeel truss bridges in Belgium to 35, either constructed or under contract. The work has all been accomplished under the general direction of Messrs. Byls and Blockmans, director and principal engineer, respectively, of the Belgian Administration of Bridges and Highways, with A. Braechman, principal engineer of bridges and highways and chief of organization of the Albert Canal at Antwerp. Heavily flux-covered electrodes and a. c. welding current have been used for all these Belgium bridges.

Much credit is due Prof. H. Dustin of the University of Brussels (now deceased) for the many pioneering investigations that were carried out under his direction. A great deal of credit also is due La Soudure Electrique Autogène (Arcos) which has cooperated extensively with the Administration in this research and investigation work as manufacturers of the welding electrodes and equipment used, and as contractors for the field welding in some instances. Credit for a large part of the development of design features and of welding procedures and control must be given to la Société Métallurgique d'Enghien-Saint-Eloi of Brussels (A. Spoliansky, chief engineer of design), who designed and constructed several of these bridges; and likewise credit for cooperation in developing reliable procedures must be shared with other fabricators such as la S. A. Les Ateliers Métallurgique de Nivelles (A. Van Gaver, chief engineer), la S. A. John Cockerill de Se-

FIG. 3—FLOORBEAM CONNECTIONS made with interposed plates on the Herthals C bridge in Belgium.



raing, and Les Ateliers de Willebroeck.

German achievements

Rapid development in arc welded bridge construction started on the continent in 1930 when German authorities established regulations for structural welding, which were subsequently revised in 1933. Important developments are still taking place in the design and construction of the German State Railway bridges of which more than 200 have now been constructed. These developments are all of interest, even though some of the design features are considered by a large number of welding technicians throughout the world as being unduly influenced by rather low unit stress requirements in some cases, and by unwarranted precautions dictated by earlier adverse experiences and test results with the use of bare-wire electrodes or other imperfect welding processes.

Special Structural Sections—Welding development began in 1929 with the use of structural sections patterned closely after those used in riveted construction which soon gave place to simpler sections composed of flat flange-plates fillet welded directly to the web, which is typical of development everywhere. However, in Germany and in Sweden, a further step has been taken, the economy and technical propriety of which have not been so widely recognized. This is the use of specially rolled flange-plate sections of various designs as illustrated in Fig. 6. Although the Wulstprofil (literally bulge-profile) does not offer the convenience of assembling that is characteristic of the Nasenprofil or Dortmund Union sections, it appears to offer improved technical advantages, whether or not the greater cost of either over plain flat plates is warranted. The Wulstprofil enables complete penetration of the joints between the web and flanges by the weld metal and a smooth filleted transition in surface contours at this joint, which in general is conducive to less concentrations of stress and therefore better resistance to shock or repeated stress. A reduced tendency of the flange-plates toward cupping is also claimed for all these sections; but such distortion has been successfully avoided in other countries by using the best welding materials and procedures. Also, full size tests seem to indicate that there is little need for grave concern over the possibility of fatigue failure in these flange-to-web joints. The Wulstprofil is listed in quite a variety of widths and thicknesses, with lengths as great as 82 ft. for the smaller sizes and 114.75 ft. for the larger. It is not likely that many sizes of any of these flange sections can be stocked, in which case serious delay or considerably greater expense would be involved in obtaining many of the sections listed, unless a very large order were involved.

Long Plate Girders—The Rügendamm bridge, Fig. 8 ("Progress in Welding Large Railway Bridges" by O. Bondy, *The Railway Gazette*, Sept. 27, 1935), composed of two fixed spans of 171 ft. each with a 95-ft. lift span between, involves the longest all-welded plate girder spans in the world, but they will be exceeded by the central span of the Passarge River bridge now under construction between Wormditt and Liebstadt in East Prussia, a 159-194-159-ft. cantilever deck plate girder highway bridge with 19.7-ft. roadway and two 6.6-ft. sidewalks, involving 416 tons of steel, partly St. 52 and partly St. 37. The longest all-welded span of any type will be the 340-ft. span, through tied arch bridge being constructed on the motor speedway at Duisburg, which will exceed the 317-ft. span of similar type, but with riveted field joints, over the Elbe at Torgau.

The complete Rügendamm bridge consists of a railway bridge and a highway bridge side by side on the same substructure, both of welded built-up plate girder construction, utilizing Wulstprofil flange sections in specially rolled lengths of 174 ft. for the main spans, to avoid flange splices that could not be made under the unit stress requirements without increasing the size of flange. Special railway trucks had to be provided to ship the long flanges from the mill. The flange sections are $21\frac{1}{2}$x$1\frac{9}{16}$ in., strengthened locally with welded cover plates, and the webs are 11 ft. $9\frac{3}{4}$ in. x $\frac{31}{32}$ in. These parts were assembled in a rotary jig at the fabricating shop, to permit all welding to be done in the flat position. The finished girders each weighed nearly 90 tons, requiring special railway trucks for shipment to the water where they were floated to the site.

Swallow-tail Splices—Of special interest are the "swallow-tail" web splices of the latest constructed railway bridges in Germany, Fig. 7, which have been adopted to provide a greater length of weld, to comply with the specifications for working stresses. It is very doubtful that anything has been gained over the ordinary accepted type of web splice with only a single vertical butt weld extending normally across the width of the web. Despite the fact that X-ray examination showed sound welds on the Rügendamm bridge at the junction of the three lines of welding at the two points in the web splice, it is certain that it would always be quite difficult to avoid defects at such places, which would constitute points at which failure would be likely to start under shock or repeated stress. The main girders of the Rügendamm bridge are heavily stiffened and the connections of the floorbeams are haunched.

X-ray Inspection—The X-ray examination of welds has become a standardized practice on German State Railway bridges. The cost has been defrayed in part by utilizing the same equipment for the examination of welded joints and other details in mechanical equipment. The equipment and technique have been developed to a very high degree, especially for use in the field, and it is intended to make

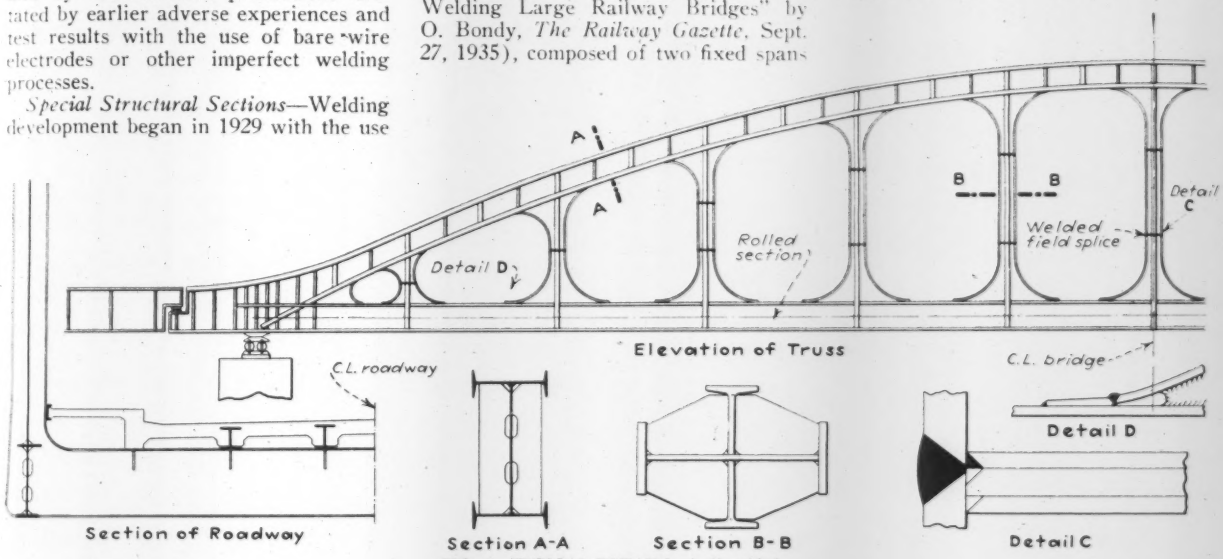


FIG. 4—TYPICAL DETAILS of all-welded Vierendeel truss bridges recently designed by Belgian highway authorities. All field connections are made with butt welds.

FIG. 5—FIELD OPERATIONS on Belgian bridge using flux-covered electrodes and a.c. current supplied by static transformers.

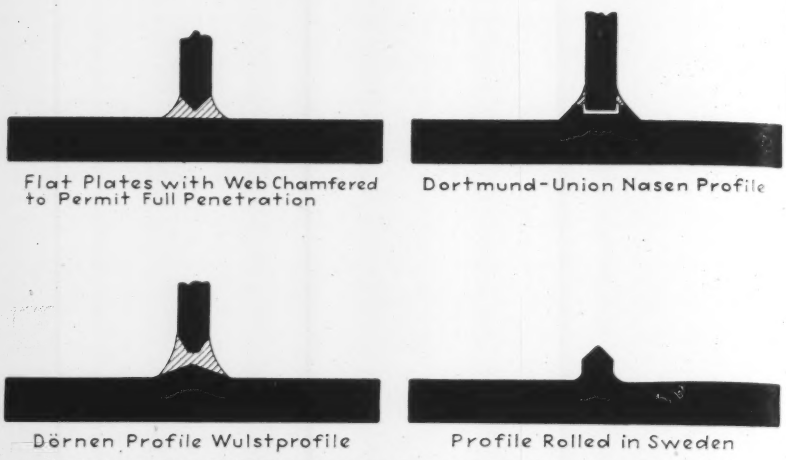

Flat Plates with Web Chamfered to Permit Full Penetration
Dortmund-Union Nasen Profile
Dörnen Profile Wulstprofile
Profile Rolled in Sweden

FIG. 6—FLANGE SECTIONS adopted by German and Swedish engineers for welded girders. Thicknesses range up to 3 9/16 in. and widths from 10 to 40 in.

periodical X-ray inspection of welded bridges during service. Magnetic clamps are used to hold the films in place during exposure, and the time for preparation is said to be only 10 minutes. By what is known as the general-exposure method, large areas involving as much as 52 ft. of welds in an entire web splice 9 ft. in height can be examined in one exposure. Voltages up to 250,000 are used, necessitating heavy insulation of the cables and special safety precautions.

It is stated that in practically all cases the welded type of construction has been selected for these German bridges on the basis of economy. The Schlachthoff bridge near Dresden, opened to traffic in May 1932, (*ENR*, Nov. 16, 1933, p. 589) is a highway and tramway bridge involving thirteen built-up all-welded girder spans of a total length of 1040 ft. and containing 500 tons of steel. Butt welded flange splices, V-shaped in plan, were used instead of normal right-angle butt welds for the same reason as in the case of the "swallow-tail" web splices described above; and their propriety has been questioned in like manner. The bar-stiffeners of the girders were staggered rather than being matched opposite to each other, with the thought that any defects such as undercutting or metallurgical damage due to heat of welding would not occur on both sides of the web at the same place. However, such defects can be eliminated by proper control, and serious difficulties were encountered in this case in the way of distortions caused by not balancing the welding on either side of the web.

High Strength Steel—Two identical all-welded cantilever deck-type highway bridges with haunched girders that were built in 1931 over the old and new channels of the Aller, a tidal river near Verden, Germany, by the Vereinigte Stahlwerke A.-G., Abteilung Dortmunder Union, are composed of three spans each, 80-131-80 ft., with an 80-ft. suspended unit in the center span. A 19.7-ft. roadway with two 5-ft. sidewalks are used. Each bridge contains 240 tons of steel, partly St. 37 and partly St. 52. These were the first important bridges to utilize the latter.

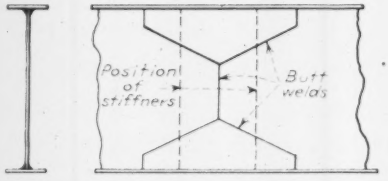


FIG. 7—SWALLOW-TAIL butt-welded web splice used for Ruhr bridge at Wetter, Germany to provide extra length of weld.

Nasenprofil flanges were used for one of these bridges and the girders of the other were built up from three flat plates. Corrugated deck-plates support the reinforced concrete floor. Characteristic of German practice at the time, all field welding of important connections was avoided, at considerable extra expense, by using costly hinge-bearing supports for the suspended span in lieu of providing continuous construction, and by completely assembling the suspended unit in the shop and then bringing it to the bridge site on barges. As compared with riveted St. 37 steel construction the welding saved 12 per cent of the weight of material while the use of St. 52 steel increased the saving to 26 per cent.

Another outstanding example of welded construction is an underpass built in 1932 in connection with the modification of the station of Augsburg-Oberhausen, to carry heavy railroad traffic over a 64-ft. roadway and two 9-ft. sidewalks. The bridge is 215.5 ft. wide carrying four platforms and eight tracks, including a double-track main line. The roadway is spanned by two 33-ft. continuous spans composed of built-up welded girders of St. 52 steel and of variable depth from 16 to 28 in., encased in a solid concrete slab, a design dictated largely by restricted headroom. Nasenprofil flanges were used, the welded construction resulting in a saving of 41 per cent in weight over that of the constant depth wide-flange rolled beams that would have been required; and a great deal of concrete was saved by employing the variable depth of deck. The girders are spaced from 2.5 to 3-ft. centers. The posts of the center support are of St. 37 steel. The total weight of the steel in the structure is 322 tons.

There is a highway grade separation of welded construction over the Frankfurt-Wiesbaden route in Germany, composed of three continuous shallow-deck girder spans supported upon two-hinged frame bents with slender columns and no bracing, constructed in June, 1934. The total length is 85 ft. with a 34½ ft. central span, 13-ft. roadway and two 20-in. footpaths. The fabrication work was of particular interest because of the jigs used and the welding procedure adopted which included the preheating of the edges of the plates in building up the girders, to avoid distortion of the unusually light sections employed.

Welded rigid frames also have been used extensively by the German State Railways.

Testing and Research—A very large part of the structural welding in Germany has been performed with bare wire electrodes, partly to facilitate automatic welding which has been used much more in Germany for structural work than in any other country. This has precluded a very extensive use of a.c. welding current. Another practice followed quite extensively is to test completed welded bridges, especially when any new procedure is being tried out, by means of a vibrating machine that is intended to open up any incipient cracks and also to relieve locked-up stresses.

Much credit is due the German authorities for the wealth of research knowledge and information gained from experience that has been contributed to the engineering profession. However unwarranted the expense of X-ray examination may be with modern welding procedures, its use has proved to be invaluable in early developments. It is unfortunate that in Germany, as in the United States, persistent efforts to utilize cheaper welding processes prevailed in structural work for quite a while after better procedures had been adopted elsewhere. As a result much of the research and experience in both countries has been greatly diminished in value. Also there is a decided tendency in this country at the present time to base specifications upon conclusions drawn from cases in which insufficient supporting data are available. The result of such misinterpretations is that unwarranted restrictions are often placed upon the designer and in some instances welded connections must be designed improperly to conform to the regulations, actually providing weaker connections under shock or repeated stress than would result if these limitations were removed. Despite all this, the vast amount of pioneering research work in Germany when properly evaluated constitutes by far the most valuable information that has been contributed in the field of structural welding.

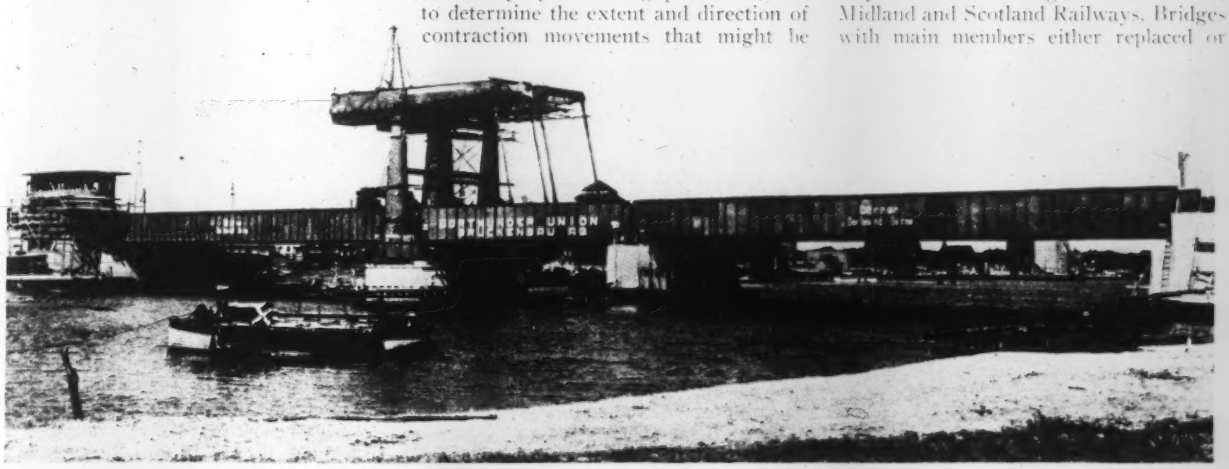


FIG. 8—LARGEST welded plate girder spans, 171 ft., on bridge between Stralsund and Isle of Rugen in Northern Germany. The movable span is also all-welded. This is one of more than 200 welded bridges constructed by the German State Railways.

Great Britain and Australia

Although a number of welded steel structures had been built in England before structural welding was used on the Continent, the first all-welded bridge was not constructed until 1933. This was an outstanding example of such construction, consisting of a cantilever deck girder structure over the Billingham Beck branch line of the London and North Eastern Railway, (*ENR*, May 17, 1934, p. 626) at Newport, Middlesborough. Steel troughing, filled with concrete for the roadway and with dry fill and bituminous wearing surface for the walkways, is welded directly to the nine lines of built-up welded girders, seven under the 38-ft. roadway and one under each 8 ft. 9 in. walkway.

The structure is designed for a particularly heavy concentrated loading of 100 tons plus 50 per cent impact on four wheels with axles spaced 20 ft. apart. Welded construction was found especially convenient because of the slight skew of the structure.

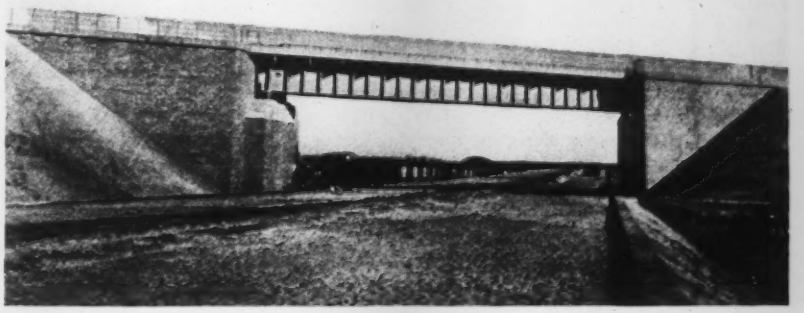
Butt welds were used freely for various splices and connections, and extensive tests were carried out, to demonstrate the adequacy of the types of welded joints used, to determine the best method of preparation of material and the proper welding procedure, and to determine the extent and direction of contraction movements that might be expected. As a result of the latter no perceptible distortions in either a transverse or longitudinal direction resulted in the structure.

The design of the welding is particularly characterized by the successful use of small size continuous fillets, some of them little more than 3/16-in. legsize, to join the web plates to the plain flat flange plates that ranged in size and thickness up to 13 x 2 in. Of particular interest were the tests to destruction under severe impact conditions, to which full size models of the stepped girder joint bearings were subjected. (*Civil Engineering*, July, 1934.) Working stresses equal to the allowable for the base metal were adopted as a result of various tests. The structure was constructed by Dorman, Long & Co., Ltd., under the supervision of Mott, Hay and Anderson, consulting engineers, and was opened to traffic in February, 1934. It involved the use of 500 tons of steel.

Repairs by Welding—Very interesting welded repair work has been carried on during the last nine years in the North East area of the L. & N. E. Railways and also on bridges of the London, Midland and Scotland Railways. Bridges with main members either replaced or repaired by means of welding have been subjected to very careful inspection by the L. & N. E., for over six years now under full load with perhaps five or six million reversals, with no indication of any kind of distress in the welds. Many of the features involved in the repairing or reconstruction of such bridges have involved problems much more difficult to solve than in new bridge construction.

Field Fabrication—Particularly notable pioneering activity in welded bridge

FIG. 9—PLATE girder railroad bridge near Hollenstedt on the Hamburg-Bremen line of the German State Railways. It is on bridges such as this that the extensive X-ray examination of welds has been carried out.



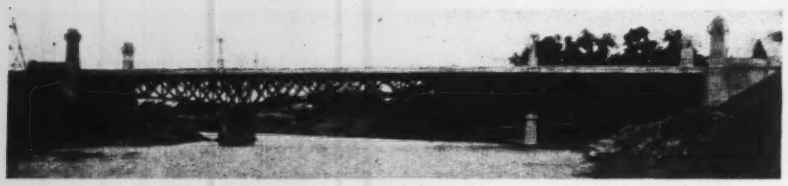


FIG. 10—TRUSS BRIDGE of all-welded construction over the Yarra River in Melbourne, Australia. The total length is 290 ft., and a 42 ft. roadway is provided.

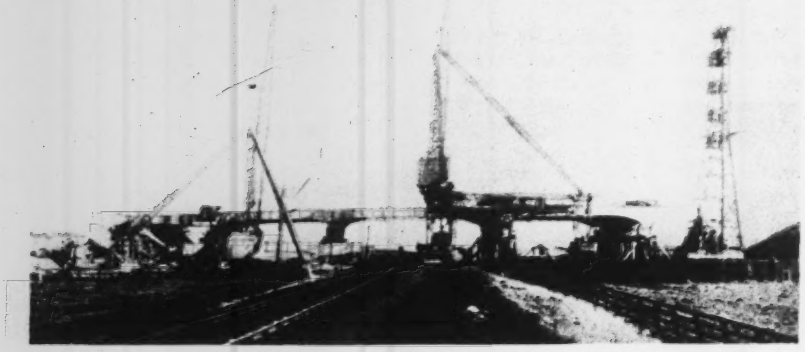


FIG. 11—WELDED VIADUCT of multi-span rigid frame type over the L. & N. E. Railway in England.

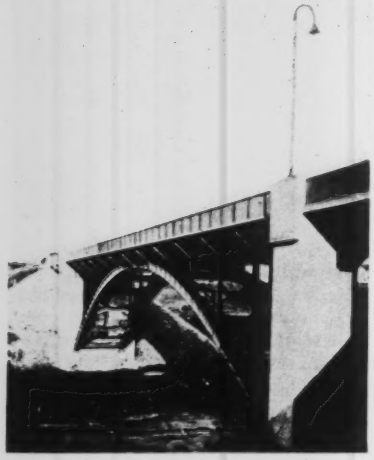


FIG. 12—TWO HINGE ARCH in Czechoslovakia of welded construction. The span is 166 ft.

construction has been sponsored by the County Roads Board and by the Railway Construction Branch of the Board of Land and Works of Victoria, Australia. Peculiar circumstances exist that make it profitable to perform as much fabrication in the field as possible, including very unfavorable freight rates on fabricated products. This construction, begun in 1928, (*ENR*, May 11, 1933) has included structural steel reinforcing trusses for concrete Melan type girders, (*Civil Engineering*, July, 1934) the trusses being designed heavy enough to support the concrete forms, a type of construction found later to be less adapted to local conditions than welded steel truss construction. Both cantilever and continuous types of all-welded trusses and girders have been used for major bridges. Arc-welding has also been employed by the Victorian Railways for the strengthening of bridges (*ENR*, June 23, 1927, p. 1017).

In Australia two distinct types of details have been used for welded trusses, one involving rolled steel members fitted together carefully with gas-cut ends and butt-welded joints as constructed by the Melbourne Gas Co., and the other with members largely built up of channels, angles, flats and T's, following more nearly the conventional riveted practice and requiring a minimum of preparation of ends of members which are usually joined by means of lap welds. The desire to avoid importing any goods that could be made locally is in part responsible for favoring the latter type of construction in Victoria, although considerable savings in tonnage have been effected as compared with the use of rolled sections.

Heavily flux-covered electrodes have been used for practically all important arc-welded work within the British Empire, and a.c. welding current is used quite extensively.

Other European examples

Largely because of the pioneering by the Skoda Works at Plzen, Czechoslovakia has contributed some notable examples of welded bridge construction. The first structure, a 161-ft. truss span, was completed at the Skoda Works in 1931. (*ENR*, March 24, 1932, p. 439). The first welded steel arch bridge in the world was a two-hinged deck type all-welded 166-ft. span, constructed in the Radbusa Valley, near Plzen by the Skoda Works, involving the use of butt-welded field splices in the arches (*ENR*, November 8, 1934, p. 593). The influence of early American practice resulted in a fairly extensive use of bare wire electrodes for these bridges, especially for the first one.

Poland has been very active in pioneer work in both welded bridge and welded building construction employing covered elctrodes from the start. The first welded bridge in Europe, an 88-ft. span camel-back truss with continuous stringers was constructed in 1929 over the Sludwia River at Lowicz. (*ENR*, April 17, 1930, p. 644). A second welded bridge at Lowicz, a through plate girder, skewed 20 deg., 52-ft. span and 18.4-ft. roadway, was constructed in 1931.

A welded Vierendeel truss span of 175 ft. with 25½-ft. roadway and two sidewalks has been constructed to carry a highway over a railway at Nuth Holland (*ENR*, Jan. 2, 1936). This structure is quite similar to the Belgian designs except that the top chords are polygon-shaped rather than arcs.

At Stalinsk, Russia, a welded bridge of 277-ft. span and 59-ft. width, to carry tramway cars and highway traffic across the River Abushka, reputed at the time to be the world's largest welded bridge, was opened to traffic in 1934. An extensive program of welded bridge construction and research work has been underway in Russia for several years (*ENR*, May 24, 1934, p. 658).

In Switzerland, France and Italy, structural welding activity has been largely in the field of building construction, but a number of welded bridges have been constructed, including a deck truss span of 122 ft. at Leuk, Switzerland, (*ENR*, March 24, 1932). In Austria the first all-welded railway bridge was built in 1929, and during the following year six welded highway plate girder bridges of 67-ft. span each were constructed. On the Vienna-Budapest highway a welded truss bridge of about 179-ft. span was constructed in 1934 over the Rába River at Györ, Hungary, involving over 110 tons of St. 37 steel.

Special Sections in Sweden—Important developments and research investigations in welding have been made in Sweden, and arc welding has been applied quite extensively in the construction of several large bridges, including an all welded street and tramway bridge over the Palsund in connection with the partly welded West Bridge over Mälar Lake near Stockholm. The Palsund bridge is about 80 ft. wide and 900 ft. long, composed of a 184-ft. deck arch span flanked by fifteen girder spans of about 39 ft. each on one end and three similar spans on the other end, with main girders of St. 52 steel. Savings of 40 per cent in weight and 25 per cent in cost were effected as compared with the alternative riveted design. Special rolled flange sections similar to the German Wulstprofil flange sections were used.

Some very excellent work has been done in Japan both in research and in

welded bridge construction including a Vierendeel truss lift bridge of 69-ft. span (*ENR*, Jan. 4, 1934, p. 9). Welding has been used also in Canada, South America and India for important bridge repair and construction work.

Conclusions

With the extensive applications that have been made throughout the world of arc welding to all kinds of construction, together with the vast amount of knowledge that has been made available through research investigations, it is hardly possible for one to encounter a problem in the welded construction of bridges of ordinary type and span lengths for which he cannot find experience records and general information relative to the safe and proper solution before he embarks into actual construction.

The lack of a widely accepted specification for welded bridge construction has been somewhat of a handicap in our own country, but a number of arc welded bridges have been constructed as recorded in various engineering publications; and two specifications have now been drawn up for such work by national organizations. The American Association of State Highway Officials issued its specification late in 1935, and a committee composed of railway and highway bridge engineers, structural engineers and welding technicians from various parts of the country, working under the sponsorship of the American Welding Society, has just completed a specification for welded bridge construction that reflects perhaps the most widespread, intensive and enthusiastic effort that has ever been devoted to such an endeavor. Experience records, research data and information have been gathered from all over the world and carefully studied.

In the meanwhile a good many bridge engineers throughout the country have been using welding for minor details and work that is not very spectacular; and in this way they are gaining excellent experience that will prepare them for a less restricted use of arc welding. The problems encountered in many of these minor details are much more difficult and complicated than those encountered in the welding of main members. Our educational institutions, governmental organizations and commercial and industrial organizations are vigorously pursuing further developments in this field. Under these circumstances we may look for this country to take a lead very soon in structural welding developments that will be comparable to that which it maintains in the field of other welded construction.

Although the sources of information for these descriptions are quite extensive and varied, special acknowledgment is made of the courtesy of Leon G. Rucquoi, editor, *L'Ossature Métallique*, H. Michel, director-general, and M. Charles, chief of works organization, La Soudure Electrique Autogène, all of Brussels; R. D. Thomas, vice president, Arcos, Inc., Philadelphia; E. P. S. Gardner, chief engineer, Quasi-Arc Co., Ltd., London; Prof. Otto Graf, Stuttgart; Dr. Ing Schaechterle, German State Railways; Robert Notvest, chief welding engineer, J. D. Adams Co., Indianapolis; Andrew Vogel, General Electric Co., Schenectady; and Metal and Thermit Corp., New York; in furnishing information and publications for use in preparing these descriptions, or in supplying photographs for use as illustrations.

Letters to the Editor

Structural Aluminum and Fatigue

Sir—A perusal of Mr. Johnson's article—"Aluminum Stringer Failures Due to Fatigue Loading"—in your issue of Feb. 27, 1936, and the editorial concerning same on page 328, raises the following points:

1. The statement that "the laboratory tests indicated that stresses of 50,000 lb. per sq.in. . . . a stress greatly in excess of the yield point of the material" does not appear to be confirmed by the yield strength test value of 49,600 lb. given in the table in the first column on p. 319. The excess is but 400 lb. per sq.in. or considerably less than 1 per cent.

2. What magnification was used for the macrographs in Fig. 3? Was the fracture along the crystal planes or through the crystals? Without this information the macrographs have no definite significance.

The low fatigue resistance or endurance limit of structural alloys of aluminum is well recognized. It is also an established fact that structural alloys of aluminum are peculiarly subject to a serious reduction in fatigue strength from notches or other stress raisers. Due to this and other dissimilarities between structural alloys of aluminum and structural steel is the fact that the steel is more ductile and will, under the undue load concentrations described, bend or become subject to local plastic flow and thus re-distribute the stress. It is this inherent quality of structural steel that enables it to carry successfully more overload than any other structural material.

It may be pointed out that all that is necessary to produce fatigue failure is a repeated stressing beyond the fatigue or endurance limit, which, as previously stated, is comparatively low in the structural alloys of aluminum—about 60 per cent of the yield point. This means that the material may be good for but 1,000,000 stress reversals or less. Carbon structural steel on the other hand has an endurance limit of about 80 per cent of its yield point and is good for 10,000,000 stress reversals. It is admitted that a requirement for 10,000,000 reversals may be unnecessarily severe, but investigators of fatigue phenomena agree that if a structural material will withstand 10,000,000 stress reversals it will withstand an infinite number.

It would be of interest to know definitely how many stress cycles structural aluminum, such as that used in the Smithfield Street bridge floor, will withstand at a definite stress range. So far as I can find out this information has never been published.

F. H. FRANKLAND,
Chief Engineer, American Institute of Steel Construction
New York, N. Y.
March 16, 1936.

Sir—Mr. Frankland's letter misquotes my statement regarding the stresses in the stringers. I said "laboratory tests indicated that stresses of 50,000 lb. per sq.in. . . . a stress greatly in excess of the *specified* yield point of the metal." The quotation omits "*specified*." It must be admitted that stresses of more than 50,000 lb. are more than 20 per cent in excess of the specified yield point. I made no reference to the yield point of the test specimen which happened to be 49,600 lb.

The magnification for the original macrograph was as follows: Left hand—10-X. Right hand—100-X. However, the photographs as reproduced have a magnification of approximately, Left—8-X, Right—80-X. Further, the picture marked Fig. 2, page 318, has been reduced to approximately one-fourth of its original size. I do not understand the second question under "2" because in the article it states: "These photographs show the joint of fracture in relation to the grain structure and indicate that the fracture was not inter-crystalline but rather trans-crystalline, following certain crystallographic planes." I believe that statement should be clear as to the type of fracture.

Insofar as the remainder of the comments are concerned, I don't believe that they need further discussion by myself. I understand perfectly well the properties of structural steel and the properties of structural aluminum and I personally feel that each metal has a definite place in the structural field.

HENRY D. JOHNSON, JR.
Chief Engineer, Department of Public Works
Pittsburgh, Pa.,
April 2, 1936.

Sir—Mr. Frankland states that "investigators of fatigue phenomena agree

that if a structural material will withstand 10,000,000 stress reversals it will withstand an infinite number." In our fatigue investigation of aluminum alloys we have not been satisfied to accept this statement, and our well-known published endurance limit of 13,000 lb. per sq.in. for the alloy used in the Smithfield Street Bridge floor (27S-T) is based on 500,000,000 cycles. If we had been satisfied to use 10,000,000 cycles, the resulting endurance limit would have been 19,500 lb. per sq.in. At one million cycles the value increases to 25,000 lb. per sq.in. The above values are for complete reversal of stress, tension to compression, rotating beam type of test. We are at present engaged in an extensive investigation of the fatigue resistance for various aluminum alloys in a number of other stress ranges. For example, alloy 27S-T, when stressed from zero to a maximum tension and back to zero in direct stress will withstand a stress of 22,000 lb. per sq.in. at 500,000,000 cycles, 30,000 lb. per sq.in. at 10,000,000 cycles, and 35,000 lb. per sq.in. at 1,000,000 cycles.

Regarding notch effect, it is true that aluminum alloys are subject to a reduction in fatigue strength from various stress raisers, as are all other materials, including structural steel. Aluminum alloys are neither the worst nor the best in resistance to notch effect, although until investigators agree on some common measure of notch effect it is dangerous to make any final comparison of one material with another. There seems to be no question, however, that structural steel is less affected by notches than structural aluminum.

Anyone who has tried to find data on fatigue resistance in various stress ranges, and for various notch effects, on structural materials will appreciate that the published information is very meager even on older materials such as structural steel. The aluminum industry takes pride in the fact that in a comparatively short period of years it has accumulated technical data of this nature which are not more complete for metals which have been in use many times as long. If Mr. Frankland has references to extensive published data on fatigue resistance of structural steel for various stress ranges and stress raisers, we would be most interested to have this information.

The faulty erection of the ties of the Smithfield St. Bridge emphasizes an interesting advantage of the low modulus of elasticity of aluminum alloys. The flange angles were subjected to a fixed deflection of approximately ½ in. which would have been the same regardless of whether steel or aluminum was used. Because of the lower modulus, a given deflection produces a stress in aluminum alloys, only one-third of that produced in steel by the same deflection, provided the yield strength of the metal is not exceeded; actually, of course, the yield strength of the steel would have been exceeded producing early permanent set followed by repeated bending up to the yield strength of the material.

It is a little difficult to decide just what Mr. Frankland has in mind in making a comparison of ductility and resistance to fatigue of aluminum alloys and stuctural steel. It does not seem possible that Mr. Frankland is trying to infer that Mr. Reppert, Mr. Johnston and associates made a mistake in selecting structural aluminum instead of structural steel for the Smithfield St. Bridge floor. Granting that structural steel is by far the most important structural metal today, as well as one of the most versatile and thoroughly reliable materials ever developed, it still could not have been used economically for the Smithfield St. Bridge floor as long as a lightweight material such as structural aluminum was available. The difference of three to one in unit weight of the two materials made possible such an enormous reduction in dead weight in the bridge floor that Mr. Reppert estimates, (*ENR*, November 9, 1933), an increased life of 25 years, thereby more than justifying the extra cost of the lightweight material. This is in no way a reflection on the merits of structural steel, but is simply one of those cases, comparatively rare outside the field of moving structures, where the engineers in charge have found the right combination of circumstances to justify the extra cost of structural aluminum.

In adopting structural aluminum they proceeded on the sound engineering basis of acquainting themselves with the properties of the material, and incorporating this knowledge into the design so that the finished structure serves its intended purpose with satisfaction. The relatively low fatigue resistance of the material was one of the properties well known to the designers, and was a source of no concern to them once they had evaluated this property in terms of design. There is nothing sinister about a relatively low endurance limit of any material and certainly this property of structural aluminum is well recognized as Mr. Frankland admits. It would perhaps be more fortunate if structural aluminum had a higher endurance limit such as structural steel, but the fact that it does not have such an endurance limit does not in any way interfere with its successful use so long as designers proceed on the basis of sound engineering principles.

R. L. TEMPLIN,
Chief Engineer of Tests
Aluminum Company of America
Aluminum Research Laboratories.

Pittsburg, Pa.
April 4, 1936

Brick Paving in Chicago

Sir—In the article "Review of Street and Paving Progress in Chicago" (*ENR*, March 12, 1936), the authors have ignored the replacement of existing paving surfaces and resurfacing projects and consequently have given the impression that the use of brick as a paving material in the city of Chicago has been discontinued since 1924. The facts are quite to the contrary and in the past five years about 50 per cent of the old wood block pavements in the Loop District have been replaced with vitrified brick. A paper on this subject was presented at the last annual meeting of the National Paving Brick Association and reported in your issue of Feb. 13, 1936.

Also in the present WPA program in Chicago about 30 miles of old brick pavements have been salvaged and relaid using about 20 per cent of new paving brick. If the program contemplated is carried out, a considerably greater quantity of this type of work will be completed.

G. F. SCHLESINGER
Engineer-Director, National Paving Brick Association

Washington, D. C.,
April 20, 1936.

Meaning Changed

Sir:

A typographical error in my article on the Ontelaunee dam changes the meaning of one of the concluding sentences. On p. 494, third column, 22nd line, the word "up" should be "us". The sentence then reads: "This grouting record certainly showed that we had struck a very pervious area and gave *us* hope that the passageway under the dam had been closed."

FARLEY GANNETT

Harrisburg, Pa.
April 3, 1936.

Flood Hazards and River Maps

Sir—Your recent editorials point out effectively that all floods cannot be prevented. It is inevitable that we will have big floods which could not be avoided by dams, forests, grasses, etc. We must have had floods from the beginning of the sedimentary age, before man began messing up the face of the earth. This is indicated by the beds of sediment that we find along the streams.

Would it not be well to learn just what areas are subject to floods, and then use these areas in such a way as not to have great damage when floods occur? We have spent many millions of dollars in the Mississippi Valley trying to control the Mississippi River. Perhaps some of the areas of the Mississippi Valley cannot be protected from floods. If those areas could be taken out of cultivation and settlement by their purchase by the federal governments, and efforts to protect them should be stopped, the chances are that we would save a lot of money. If we had good maps with small contoured intervals of the Mississippi Valley, the federal government could have prevented the taking up and settlement of

those lands that have required such vast amounts of money to protect them from floods.

I think much of the flood damage is due to the fact that our citizens really do not know how high their land is above maximum flood level. Good topographic maps along all of our water courses would enable anyone to determine just what land would be overflowed for any particular flood stage. They would have to be large-scale maps, however, with contour-interval 1 to 5 ft.; the existing mile-to-the-inch topographic map of 20 ft. contours would be of little or no value.

WILLIAM BOWIE

Washington, D. C.
April 24, 1936

LARGE-SCALE river and bottomland maps would doubtless be of much value for the prevention of flood damage if supplemented by adequate estimates of probable flood magnitudes. On most if not all streams the length of record is too short to justify the assumption that the greatest flood of record is the maximum against which provision must be made. The experiences of Hartford, Harrisburg and Pittsburgh demonstrated this only recently.

—EDITOR.

Correction—Soil Mechanics

Sir—William P. Creager has called attention to an omission in the article on "Practical Soil Mechanics at Muskingum—II" in the "Engineering News Record," April 9, 1936. In the first column, on p. 532, the thirteenth line from the bottom should read "cube of saturated soil" instead of "cube of soil."

A foot cube of saturated soil weighing 125 lb. with a porosity of 0.41 would have a normal specific gravity. If it were considered as dry rather than saturated, the specific gravity of the material would be far higher than anything met in practice.

T. T. KNAPPEN

Senior Engineer, Chief, Engineering Division, United States Engineer Office
Zanesville, Ohio.

Self-Anchored Suspension Bridges

Sir—In your issue of March 26, 1936, is a letter by Prof. A. A. Jakkula, in regard to my article, "The Self-Anchored Suspension Bridge" (ENR, Jan. 9, 1936), in which he expresses some doubt that Josef Langer should be given credit as being the originator of this type of bridge.

In matters of this nature it often becomes quite difficult to establish definitely the priority of ideas or inventions and to place credit where it is due, because inventors or mathematicians in widely separated countries may originate the same device or theory quite independently of one another.

Although Mr. Langer did not actually build a structure of this type until the year 1870, we find that he proposed the self-anchoring of suspension bridges in his book, *Die Eisenkonstruktionen für Brücken und Dachstühle*, the first edition of which appeared in 1859.

If we must base our conclusions in this instance on documentary evidence alone, and it appears we must, we shall have to give priority to Mr. Langer because Mr. Bender's patent bears the date 1867.

HOWARD MULLINS

Jefferson City, Mo.
April 7, 1936.

Employment Through Useful Works

Sir—Reference is made to your recent editorial on jobs at low cost (*ENR*, April 23, 1936). The general argument in favor of useful and durable public works for relief service is excellent in many respects, although in my opinion lacking in a very important particular: There is no mention of the fact that durable public works will provide employment, in greater quantity than on the work, in plants, mills, mines, and transportation agencies, which is not true of the other type of work-relief projects. *It is this industrial labor that is the most important factor in the permanent solution of the unemployment problem.*

In this connection I quote one of the planks of the "Platform" adopted at the last annual meeting of the American Road Builders' Association:

> "In the course of economic studies conducted by various research agencies, appraisals of the economic significance of the highway industry frequently take cognizance only of the employment on operations that are carried on in the field and ignore the other employment that is inseparable from those operations. We urge therefore, that in considering the effect of highway expenditures on the employment of labor, full value be ascribed to the industrial labor involved in the production, processing and distribution of materials, machinery and equipment as well as to the field labor employed in construction."

G. F. SCHLESINGER

Washington, D. C.
May 7, 1936.

Engineer-Director, National Paving Brick Association

MR. SCHLESINGER'S POINT is pertinent. This journal has consistently urged that the extension of employment effort through the whole fabric of industry and business is the paramount reason for a constructive works program carried out by normal methods and agencies, to fight depression unemployment most effectively. Such a plan is in irreconcilable opposition to the deteriorating influence of social-worker charity methods such as dominate our current handling of unemployment problems and make no progress toward reducing idleness.

—EDITOR.

Early Concrete Trusses

Sir—The photograph on p. 1 of your issue of Jan. 2 recalled to the writer's mind the first concrete trusses designed by our engineering department (and the first of which we had any record here) almost twenty years ago.

A theater that had been started during the war was held up when partially constructed due to the inability of the owners to obtain a priority order, as was required for the furnishing of structural steel at that time. Although ordinarily there would be no economy in a concrete truss of this type as compared with structural steel, it was a very important help in this instance, since the owner was enabled to complete his project and open his theater through the use of reinforced-concrete trusses designed by our Mr. Baker.

J. R. FENSTERMAKER,
Secretary, Hugh J. Baker & Co.

Indianapolis, Ind.,
Jan. 29, 1936.

CONSTRUCTION and completed views of reinforced-concrete trusses built in the Auditorium Theatre, Indianapolis, twenty years ago.

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May 14, 1936

Championing Inefficiency

THE STATE DIRECTOR of PWA in Illinois has just completed a remarkable operation of assuring competition on a public-works job. Bids for a bascule span and a steel girder approach on Chicago's Outerdrive project were rejected several months ago, and the single contract was split up into nine contracts, five for fabricating and four for erecting the steel. The new bids are now in and show either an increase in cost of $63,000 or a saving of $85,000 depending on the particular reasoning used. The total cost is about $2,000,000. Competition no doubt was achieved, and a great principle upheld. Unfortunately the competition is not yet finished, for the four steel erectors must still compete for elbow room to carry on their jobs. Division of labor is a fine economic concept, but so is the law of diminishing returns. On a $2,000,000 bridge job, the latter would seem more applicable.

Building-Code Delays

FOR NEARLY A DECADE revision of old or obsolete building codes has occupied cities both large and small. How many hundreds of hours have been freely given by engineers to this task it would be difficult to estimate. But that the labor has been great and the sacrifices in time and money large there can be no doubt. All of these public-spirited citizens can look back upon their work with a feeling of pride. Yet for a large percentage of them the feeling of accomplishment is unavoidably lacking, since the codes that their labors wrought have not been adopted. Especially is this true of the larger cities such as New York, Chicago, Boston and Detroit, the very cities where modern building methods should prevail and uneconomic and obsolete requirements should not be perpetuated. In each of these cities everything has been cleared away for action time and again, only to have some new obstacle raised. In Chicago, the city council has pigeonholed the code for no good or explainable reason. New York's procrastination in approving its code is a prime example of political perfidy. Boston and Detroit have fared no better. Add to the shortcomings of municipal management the shortsighted maneuverings of commercial interests for special advantages, and the reasons for building code delays are delineated in full.

Explaining Practice

AMONG THE ESSENTIAL POINTS of interest in Prof. Terzaghi's clear statement on earth pressure against the sheeting of trenches and pits is the fact that experience preceded theory by many decades, and theory now is merely explaining what has long been known empirically. The fact is that the theory has come into being only within the past dozen years; the classical doctrine of the sliding wedge continued to be taught in the schools as something to be applied to sheeting and bracing, in defiance of all the facts of practice. Meantime the bin effect, or arching, had been recognized both qualitatively and quantitatively a good many years earlier, but the close parallelism of bin action and trench action was not definitely recognized. Now that we are able to explain trench action in agreement with practice it is likely that by the fuller use of the new theory it will be possible to contribute to refinement of practice. At the same time it is worth remembering that the theory itself may need to be refined and further developed, especially by extension to include various types of soil, whether uniform or stratified, and that constant testing against practice is especially important in the case of youthful theory. Applied thus prudently to practice, theory should extend materially our ability to deal with soil problems.

Habit or Design?

THE COST of foot renewals has been accepted as a necessary maintenance item attendant upon use of petrolithic or sheepsfoot rollers. On some jobs this item is quite large even when the material compacted is not particularly sharp or hard. For the rocky fill to be compacted on San Gabriel Dam No. 1 the cost of foot renewals was recognized as serious, and engineers of the Los Angeles County Flood Control District undertook to design equipment that would require minimum maintenance. Not only did they succeed in keeping maintenance low but they seem to have reduced it to near the vanishing point. This success is ascribed to selection of a design which avoids the "hammer-mill" action and the attendant unnecessary wear on the feet. The general design of the rollers is not essentially new, although the drums are larger and heavier than standard and certain ingenious details are used. For this reason space is given in this issue to details of the new design. This instance emphasizes the importance of challenging and checking methods and equipment that may be in vogue more because of convenience than because of fitness for the work, i.e., that may be just a habit.

Behind in Bridge Welding

STRUCTURAL WELDING, in spite of its rapid development and acceptance, has not lived up to its possibilities in the bridge field. The record of welded bridges in this country—other than strengthening and repair jobs—is unimpressive, and when compared with that in Europe it is hardly worthy of note. What such countries as Belgium, Germany, Czechoslovakia, Russia, Poland and Great Britain have accomplished is outlined in this issue by LaMotte Grover, a close student of the welding art as it applies to bridges. Among the structures cited are trusses of over 200-ft. span, plate girders as long as 194 ft., an arch of 340 ft., swing bridges, lift spans and continuous girders. Both highway and railway traffic are carried, the German railways having over 200 welded bridges on their lines. The reason most often given for our tardiness in accepting welding for bridges is that research data are lacking on the action of welds under dynamic loads. The comprehensive research program sponsored a number of years ago by the American Welding Society was confined to static loads and used bare welding wire only, whereas the coated wires now available give welds of higher ductility. European experience of the last five years is much broader, and affords many useful data. Some of these have been used by a committee of the American Welding Society which has been correlating available research results as the basis for a bridge welding specification. That specification has just been published and is available for use; it should mark a

turning point in welded bridge development. At the same time the fact remains that it is based largely on the judgment of the committee, and therefore strengthens rather than lessens the need for a new research program. The article in this issue suggests several lines that such research might follow in order that bridge welding in America shall not much longer trail the art in other parts of the world.

Publicity Run Wild

RECONSTRUCTIVE activities which like soil erosion and forestry rest on a sound foundation of useful service to the nation are more likely to be harmed than helped by highly-colored claims. Some recent bureau propaganda on flood causes and flood prevention is objectionable on this score. Both the Forest Service and the Soil Conservation Service took the occasion of the recent northeastern floods to publicize their own importance in relation to flood prevention, and did so in patently misleading manner.

Striking squarely into an issue that has been in dispute for many years past, the Forest Service headlines an April 18 press release with the unqualified statement, "Figures leave no doubt forests control floods." Only in the last sentence of the release is the reservation made that "Studies so far have been scattered and fragmentary. . . . Large-scale watershed experiments are needed for fuller information."

Some weeks earlier, in fact immediately after the March floods, the Soil Conservation Service blamed the floods on faulty land-use practices. Its release of March 20 asserted that "overcutting of woodland, excessive cultivation of steep slopes and generally unwise use of land in the badly flooded areas are to a considerable degree responsible for the present acute situation." It goes on to say, "Erosion control operations have greatly reduced floods on a number of typical headwater streams in our demonstration watersheds. If floods can be reduced in this manner along the 'little waters,' there is no reason why they cannot be reduced all the way down the drainage basins through which the larger streams flow." Connecticut River states will take notice!

Perhaps it is regular policy of the Soil Conservation Service to take advantage of floods to press its claims, for it made similar press propaganda last June. After the destructive flood in the Republican River in Nebraska and Kansas it said, "Racing flood waters . . . can be materially reduced in the future by a thoroughgoing application of soil conservation measures," and, "If the whole basin were treated we could keep enough of the water out of the stream so that the flood stage would seldom be reached."

Of course, facts that traverse these assertions are known to everyone. Floods visited stream valleys long before the days of the farmer and the logger. Even prior to the white man's coming there were great floods, perhaps greater than any that have occurred since. When De Soto first saw the Mississippi River it filled practically its whole valley, and Indian refuge-mounds in the flood basins of Louisiana and Arkansas, rising to the height of the most modern levees, stand witness to the volume of floodwater that flowed down its unconfined areas long before the plowman reached the Great Plains or the hardwood forests of the Ohio valley were cut down. To assert that restoration of the forests and of sod-cover, or strip-cropping, or gully-control check-dams, will cope with the flood problem is deception and demagoguery.

Especially unfortunate is the fact that these extravagant claims awaken disbelief in all the proper claims for care of our lands. That forest conservation and maintenance, and the protection of agricultural soil against wastage by washing, do in many cases (though of course not always) reduce the suddenness of runoff from flash rainfall is a truth that deserves universal recognition. But it is likely to be forgotten and denied as a result of over-enthusiastic publicity efforts.

No More Blank Checks

A SHORT TIME AGO we cited figures that show the effectiveness of the PWA method of counteracting unemployment. Less than $750 produced a man-year of employment, and far-spreading recovery effects were produced through reviving industry by hundreds of millions worth of material orders and through re-starting the financing and building of necessary improvements. Nothing like this can be said of the unfortunate experiment of WPA relief work operations, the consequence of Congress writing a blank check a year ago.

Yet, in the haste of Congress to adjourn, the present prospect is that it will again write a blank check and permit the WPA system to be continued—perhaps perpetuated. This is something against which each citizen, the engineer-citizen in particular, should protest. Protest alone is idle, of course. While millions of men are still looking for employment, a mere do-nothing plan is out of the question, and proposals to do away with the WPA system and put nothing in its place cannot expect to be heard. An aggressive and adequate PWA campaign should replace WPA relief.

It is notorious that the well-intentioned advance plans of WPA operation—a subsistence wage to spread the relief money far; a selection of works that would keep clear of the field of normal and private activity; efficient and well-managed operation—have gone hopelessly wrong. Strikes, prevailing-wage-rate, discrimination in favor of special groups, interference with normal business enterprise, wasteful operation, have demoralized the program. More than this, they have made WPA an object of universal disapproval and contempt.

Meanwhile the country's equipment of public facilities is running down progressively. Its housing, its pavements, its safeguards against flood, are grossly inadequate. There is more needed work to be done than five years ago, in the early days of the depression, and correspondingly greater opportunity for helpful stimulation and aid to do this work. The PWA campaign despite its laggard beginning did in time prove its ability to utilize this opportunity as a means of combating the unemployment evil with minimum disadvantage to other requirements. It is the most constructive means at hand for creating the employment that is imperatively needed.

A strong party in Congress has made the first step of demanding that a large part of the proposed additional recovery fund be set aside for PWA projects. It should go farther, and end the WPA relief system entirely. There should be no more blank checks. The disguised dole should be abolished, and the full power of recovery effort should be applied to construction of necessary improvements by tried and efficient construction procedure.

CURRENT NEWS

Substandard Housing Legally Defined

Based on testimony concerning deficiencies in old housing and giving owners a hearing before a housing board of appeals, an ordinance for the elimination of substandard housing in Chicago is well on the way to passage. Definitions of standards required before condemnation are set forth in the ordinance and the appeals board will put on record, for use of the courts later if necessary, facts as to whether the facilities of buildings measure up to the minimum standards named. Heretofore, except in unusually flagrant cases, the building commissioner, the health commissioner or fire chief would not order a building torn down because of the fear that he or his bondsman would be personally liable should the owner elect to sue and get judgment.

Despite the demolition so far of 2,400 houses unfit for habitation (occupying 140 acres) through the efforts of the Metropolitan Housing Council some 9,600 dwelling units still need removal. The 2,400 were removed by consent of the owners. Owners of the larger number either cannot be reached or refuse to let their buildings be torn down. The Housing Council has been largely instrumental in getting the ordinance drafted, since clearly defined standards are needed by which to judge whether or not a given structure is habitable. Legal support of the officials enforcing these standards is available in the ordinance now up. It does not change the powers possessed by the health, building and fire officials but simply aids in their administration.

Minimum standards

Certain of the minimum standards set up are as follows: Window glass space shall be equal to 10 per cent of the floor area of a habitable room. Each family dwelling unit shall have at least one sink with running water and an exclusive water closet, lighted and ventilated. Hopper toilets and those outside are forbidden. Enough fireproof chimney flues are to be provided to permit proper heating facilities.

Changes in Grand Coulee Dam Contracting Personnel

George H. Atkinson, son of one of the firm members, has been appointed job manager of the Grand Coulee Dam by the contractors, the Mason-Walsh-Atkinson-Kier Co. Mr. Atkinson succeeds H. L. Myer, who has resigned from the MWAK Co. Sam A. Mason, II, has been elected a director of the company and will also serve as treasurer, succeeding W. A. Hanger in both positions. Earlier in the year C. D. Riddle advanced from job engineer to chief engineer for the contractors. Francis Donaldson formerly served as chief engineer, but resigned to give attention to affairs of the Mason interests in the East.

Columbia River Power Before Senate

Senate Committee considers legislation for sale of power—License sought for a private project

HEARINGS on proposed legislation for the disposal of electric power in the Columbia River valley started May 7 before a subcommittee of the Senate Committee on Agriculture and Forestry. With power production at Bonneville scheduled to start in 18 months, several suggestions have been advanced for the orderly and effective marketing of the surplus power from this and future plants in the region, such as Grand Coulee.

Resources Committee report

Last July Senators McNary and Steiwer introduced a bill placing the War Department in charge of the operation of the Bonneville project which it is now constructing, directing the department to contract for the sale of excess power at rates to be approved by the Federal Power Commission. Last week (*ENR*, May 7, p. 676) the National Resources Committee submitted a report to the President recommending the setting up by the government of a regional corporate agency to handle not only the marketing of surplus power, but also other problems affecting the region as a whole, such as planned public works, forest conservation, and reclamation. Such an agency would bear a strong resemblance to the Tennessee Valley Authority. These suggestions, and others, are being laid before the subcommittee, which will endeavor to settle upon a plan for presentation to Congress.

Kettle Falls Project

While the Senate committee is considering the broader problems of power use in the Columbia River valley, the Federal Power Commission, on May 25, will begin hearings on the application of the Washington Water Power Co. for a license to develop power at Kettle Falls on the Columbia River in Washington. The company now holds a preliminary permit to develop the site which lies between Grand Coulee and the Canadian border. A total of 120,000 hp. of primary power can be developed at the site.

The application of the Washington Water Power Co. for authority to go forward with its plans to develop the Kettle Falls site is considered significant because the construction of a high dam at Grand Coulee would extend the reservoir behind that dam to the Canadian border, submerging the Kettle Falls site. The present low dam at Grand Coulee is being built to facilitate future construction of the high dam.

Because of this plan, and because there appears to be no market for the Kettle Falls power, the Columbia Basin Commission has expressed objection to the proposed scheme.

Tentative Plans Submitted For Battery-Brooklyn Tunnel

Tentative plans for a proposed vehicle tunnel between Battery Park, at the lower end of Manhattan Island, and Brooklyn, N. Y., have been submitted to the Board of Estimate by the Board of Transportation. In this report it is pointed out that the proposed tunnel would seem to be a useful public improvement and that traffic estimates indicate that it would be able to earn enough to more than meet the annual charges of $3,965,350.

Plans call for the construction of two two-lane tunnels costing $60,309,000 and a bridge over the Gowanus Canal in Brooklyn costing $2,300,000. The tunnel would extend from the south end of West St., Manhattan, to the north end of Hamilton Ave., Brooklyn, a distance of 10,300 ft. The underwater section would be 5,900 ft. long. The Holland Tunnel has a total length of 5,900 ft. of which 5,500 ft. is under water.

It is estimated that the tunnel would cost $949,000 for operation each year and would carry annual fixed charges of $3,015,450. The report assumes that fixed charges would consist of 4 per cent interest and 1 per cent amortization. To meet the fixed charges and operating costs, 7,930,700 vehicles paying a total charge of 50c. would be required each year, and at a rate of 25c., 15,861,400 vehicles would be needed.

Federal Aid Highway Bill Passed by Senate

The Senate passed without a record vote on May 8, the federal aid highway bill, substantially in the form reported from the Committee on Post Offices and Post Roads (*ENR*, May 7, 1936, p. 676). An amendment, proposed by Senators George and Russell of Georgia, was adopted, providing that in conjunction with the authorization of $25,000,000 for secondary and feeder roads in each of the fiscal years 1938 and 1939, the Bureau of Public Roads deal directly with county authorities having supervision of this type of roads. The Senate also adopted an amendment offered by Senator Hayden, of Arizona, authorizing states to collect gas taxes on all sales made on government reservations for other than governmental use. The Senate rejected an amendment offered by Senator Capper, of Kansas, to prohibit the use of foreign materials, aimed principally against asphalt made from Mexican crude oil. A similar amendment offered by Rep. Cartwright, of Oklahoma, previously had been defeated by the House.

Forest Conservation Bills Receive Favorable Support

A joint conference of public and private forest conservation interests meeting in Washington May 6 endorsed legislation covered in the McNary-Doxey "sustained yield" bill, Fletcher forest credits bill and measures affecting national forest exten-

sion and administration. The conference also reviewed the tangled situation involving revested Oregon & California Ry. lands in Oregon which the committee is striving to bring under sustained yield management. Complications are due mainly to the fact that administration of this land has been under pressure to sell timber rapidly in order to provide income to the counties in lieu of taxes previously paid by the railroad. For this reason, it was reported, the General Land Office has not adopted conservative methods of handling.

The next fiscal year's appropriations for the Department of Agriculture may make available, it was reported, larger funds for the Forest Products Laboratory at Madison, Wis., than it has ever had before and, provision, under the Clarke-McNary bill, for fire, insect and disease control. It is hoped that the forest survey will go on substantially as at present and that $10,000,000 may be available for national forest acquisition. The U. S. Forest Service has projected, out of emergency funds, purchases in more than 90 units, mostly east of the Great Plains and almost invariably including cut-over lands of low unit value.

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Milwaukee Sludge Payments Modified by Court Order

Pending a decision as to the royalties that the city of Milwaukee, Wis., will pay to Activated Sludge, Inc., for the use of a patented sewage treatment process at the Jones Island plant, the U. S. Circuit Court of Appeals ruled on May 2 that the city is entitled to the return of $258,204 already paid. This amount represents 85 per cent of the money impounded from the sale of Milorganite, a sludge fertilizer product, by the Milwaukee Sewerage Commission, under an original order of Federal Judge D. A. Geiger.

The city appealed from this order to the circuit court of appeals, which last January modified Judge Geiger's order by ruling that only 15 per cent of the profits need be turned over. By that time the city had paid over $303,769 and it was argued that 85 per cent of this sum should be returned. Activated Sludge, Inc., however, took the stand that the 15 per cent modification order applied only to future payments by the city, and the matter went back to the circuit court.

The circuit court held its order to be retroactive, stating "It was quite impossible to conceive of an accounting wherein all proceeds from the sale of Milorganite could be called all profit."

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Quebec Commission to Study Power Rate Bases

The Quebec Electricity Commission has issued an order calling on all electric companies operating within the province to submit, within sixty days, schedules outlining the extent, nature, and location of all the plants and equipment used by the companies, in the production and distribution of electrical energy in the province. This move is to enable the commission to decide on what steps may be taken to establish real values of, and true capital expenditures invested in hydro-electric utilities of the province, in order to determine just and equitable rates for the sale of power.

Relief Works Bill Passed by House Without Provisions For PWA

Carrying no appropriations for the continuation of the PWA program the $1,425,000,000 relief works bill is scheduled for easy passage through Congress—TVA's budget cut eliminates dam at Fontana site

(Washington Correspondence)

WITH NO PROVISION for continuing support of a public works program, the $1,425,000,000 relief works bill is being steered through Congress in strict compliance with sailing directions from the White House. Intended only as a stopgap until next Spring, the bill which passed the House May 11 is described by Harry Hopkins, WPA administrator, as a "palliative."

Asserting that relief does not answer the problem of unemployment, Hopkins had previously warned the House Appropriations Committee against increasing pressure for adoption of any permanent plan of relief. That a permanent plan, in which the federal government must share, will be needed is conceded by Hopkins but, in line with the President, he contends that there ought to be a greater increase in private employment before that is given consideration. In Hopkins' opinion, Congress might better be thinking over the whole problem of unemployment itself rather than the relief problem.

The WPA administrator endorses President Roosevelt's proposal to limit the working span of life to the years between 18 and 65 with estimates that 2,000,000 children and 3,000,000 adults outside of these limits are on industrial payrolls today. For this reason did the administration turn back the proposal, sponsored by Rep. Taber, New York Republican, to abandon relief works and hand the money over to the states for distribution as a dole. Incidentally, Hopkins argues that the cost to the federal government would be just as large as the present work-relief program.

Relief works ideas changed

The administration's ideas regarding the conduct of the relief works program have changed in some particulars. There was some surprise when the floor managers of the bill accepted an amendment by Connery, chairman of the House Labor Committee, providing for payment of prevailing wage rates. The fight on this issue featured enactment of the $4,000,000,000 bill a year ago. Union labor lost out at that time. Since then, however, WPA's experience, according to Hopkins, "has led us to believe that we should pay the hourly prevailing rate in the community but continue to put a top limit on the amount we pay in a month."

The bill's managers anticipated a Republican coup by barring illegal aliens from employment on relief works projects. This was agreeable to Hopkins who had previously suggested that Congress indicate its intent on this issue. Hopkins also is in sympathy with an amendment providing for enrollment by WPA, upon investigation, of destitute persons not on relief rolls. The difficulty lies in adopting an intake procedure that will not let in all the unemployed in the country.

The relief works budget was cut from $500,000,000 to $425,000,000 to allow for an increase from $246,000,000 to $308,000,000 to carry the CCC at an enrolled strength of 350,000 until March 31 next year. Defeated in the House on a point of order as not germane to the bill, the proposal to divert a portion of the relief works appropriation for continuing PWA grants and loans for municipal public works does not promise to fare any better in the Senate. The only possibility is that grants may be made for PWA projects that are acceptable to Hopkins, and the balance of their cost covered by loans from the Reconstruction Finance Corp. Some projects are pending in PWA that could readily be done with relief labor and these, says Hopkins, WPA would gladly undertake.

The bill embodying the relief appropriation carries $65,550,000 for public building projects selected by Postmaster General Farley and Treasury Secretary Morgenthau. TVA's budget was cut from $43,000,000 to $39,900,000 with instructions to start building the Hiwassee River dam and abandon a possible alternative site on the Little Tennessee near Fontana, N. C.

Ickes may testify

Administrator Ickes, who did not appear before the House Appropriations Committee, possibly will be invited by the Senate Committee to testify with respect to PWA's operation. Senator Hayden, of Arizona, will lead the fight in the Senate for continuing the PWA program. Instead of earmarking a portion of the relief works fund for this purpose he is urging an amendment to increase the total by $700,000,000. Ickes ordered PWA division heads on May 9 to be ready for a reduction of 25 per cent in the administrative staff by preparing lists of employes who can be dropped. No date has been set for dismissals that would affect 2,250 employes. At this time this may be simply a dramatic effort to focus attention on PWA's extremity but a reduction in PWA's staff, with the exception of the inspection division, is inevitable if no more funds are provided to finance new projects.

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Bridge and Road Project Proposed in Denmark

A ten-year program for modernizing roads in Denmark, including the erection of two large bridges, has been submitted to the Ministry of Public Works. The plan, which would greatly decrease unemployment in the country, includes 425 miles of new roads, of the autostrada type, extending from the German-Danish frontier to the north of Jutland via Funen to Copenhagen. Two large bridges are included, one 10.87 miles long connecting Funen and Zeeland across the Great Belt, and another 8.7 miles long would connect Copenhagen and South Sweden across the Oeresund. The plan which would require about $150,000,000, was proposed by three large Danish engineering concerns: Christian & Nielsen, Hojgaard & Schultz, and Kampmann, Kierulff & Saxild.

A. S. Tuttle Nominated for New York PWA Director

Arthur S. Tuttle, acting PWA director in New York State, has been nominated as state director by President Roosevelt. Mr. Tuttle's appointment has been sent to the Senate for confirmation. Since his appointment as State Engineer in 1933, Mr. Tuttle has served as head of the Public Works Administration in the state. He was named acting director in May, 1935. Included in his jurisdiction are such projects as the Triborough Bridge and the Midtown Hudson Tunnel. Mr. Tuttle, who is a past president of the American Society of Civil Engineers, had been associated with New York City in an engineering capacity for almost fifty years, before assuming his work under the PWA.

Charter Sought for New Railway To Serve Northern Quebec

Powers are being sought before the present session of the legislature of the province of Quebec for the construction of a new railway to serve the northwestern part of the province and also the Chibougamau mining area, west of Lake St. John. A bill has been introduced, the promoters being L. Prevost, D. Hillman, and G. Ommanney, two last named being officials of the Canadian Pacific Ry. which is understood to be behind the scheme. Surveys were made by the C.P.R. some years ago over a part of the route considered. The bill authorizes capital stock of $1,000,000, and permission is sought to bond the line to the extent of $60,000 per mile of road.

The line will start at Angliers, the present railhead of the C.P.R. branch that runs from Mattawa, Ont., up the eastern side of Lake Temiskaming, and will extend from there in a northerly direction until it reaches Rouyn township at a point near to the mining town of Noranda, Que. It will then turn in a northeasterly direction, through an area now being actively developed as mining country, until it reaches the town of Senneville. After crossing the Transcontinental line of the C.N.R. it will proceed by the most feasible route to a point at or near Lake Chibougamau.

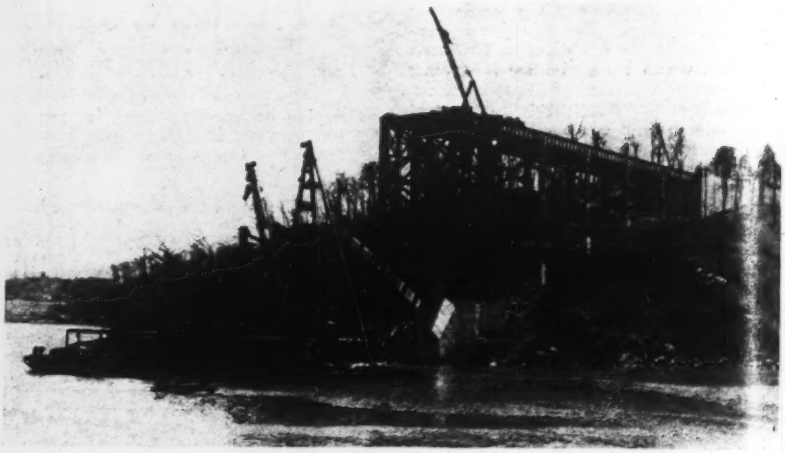
Safety Emphasized at Sewage Works Meeting

The New England Sewage Works Association held its meeting at Hartford, Conn., on April 27. Warren A. Cook, chief of industrial hygiene of the bureau of occupational diseases of the State Department of Health of Connecticut, speaking on safety measures in sewage plants said in part:

"Gas masks should be part of the general equipment of every sewage plant in the country, and the operators of these plants should be required to take part in gas mask drills several times a year. Several lives are lost every year in sewage treatment plants because the operators do not use proper precautions in the use of gas masks.

"In many cases the plants are equipped with the proper number of gas masks, but the operators either do not know how to use them, or the men do not know where to find the gas masks in times of emergencies."

Other speakers included Dr. Stanley H. Osborn, Connecticut Commissioner of Public Health, who spoke on "Teaming Up for Public Health." W. J. Shea gave an illustrated lecture on "The Explosion at Bristol, R. I." Edward M. Savage and C. A. Emerson, New York, described the new pilot chemical sewage plant under construction in New Britain. A tour of inspection was made of this plant, which will have a disposal capacity of 100,000 gallons per day. E. Sherman Chase, Boston, Mass., read a paper outlining a "Safety Code for Sewer and Sewage Treatment Design and Operation."



STEEL ERECTION BEGINS ON 800-FT. HINGELESS ARCH BRIDGE

With the initial stage of arch rib erection on the Henry Hudson Bridge at New York complete, preparations are being made for next Sunday for a derrick boat to set the 140-ton bracing cage for the second falsework bent 90 ft. ahead of the one shown in the above view which is 100 ft. in front of the south skewback. From the second bent to the center of the 800 ft. span, erection will be by the cantilever method. A similar schedule is being followed on the north end of the arch span but there both falsework bents are on shore. A toggle over the second falsework bent will aid in supporting the cantilever arm which will be 210 ft. long; eyebars fastened to the top of the toggle post will be connected to the arch rib about 125 ft. front and rear of the post thus relieving the moment in the arch rib over the falsework bent.

The arch is believed to be the longest of hingeless type ever built. Unusual care in setting the skewback supports and in effecting closure at the center is a requirement of this type of construction. According to the present erection schedule closure of the ribs which are double-web box girders 12½ ft. deep and 3 ft. 8 in. wide will occur sometime in July. For the work next Sunday the Harlem Ship Canal will be closed to boats for the first and last time during the erection period.

For the Henry Hudson Bridge Authority, Madigan & Hyland are consulting and supervising engineers. Robinson & Steinman are consultants on the arch design and Aymar Embury II is consulting architect. The contractor is the American Bridge Co.

RFC Makes Loans for Disaster Relief

Emergency disaster-relief loans, totaling $850,000, have been made by the Reconstruction Finance Corporation to 100 communities, according to a recent announcement by Chairman Jesse Jones. Of the loans, 40 were made in Georgia, 30 in Pennsylvania and 20 in New York. RFC regulations for this type of loans were recently liberalized by Congress.

A number of bills providing for the preliminary flood-control examination of various rivers and streams have become law with the approval of the President. These included: Marais des Cynges River, Kansas; Walla Walla River, Wash.; Chichasawha River, Miss.; Cosatot River, Ark.; Red and Little Rivers, Ark.; Little Missouri River, Ark.; Petit Jean River, Ark.; Big Mulberry Creek, Ark.; Cadron Creek, Ark.; Lowell Creek, Alaska; San Diego River, Calif.; Matanuska River, Alaska; Passaic River, N. J.

The House Judiciary Committee has reported favorably a bill to authorize interstate compacts for flood control and stream pollution in New England.

Bids Invited for Housing Projects

Bids for the erection of buildings on the College Court housing project, Louisville, Ky., will be opened on May 17 by the PWA Housing Division and bids for the Fairfield Court project, Stamford, Conn., will be opened on May 26. The College Court project will house 125 families in one- and two-story group houses and two-story flats. An allotment of $700,000 has been set aside for this project. Construction plans for the Stamford project call for the erection of three-story apartments and one- and two-story group houses, providing living units for 154 families. An allotment of $800,000 has been made for the Fairfield Court project.

A contract for the construction of superstructures on the Jane Addams Houses, Chicago, Ill., has been awarded to the S. N. Nielson Co. on a bid of $1,334,650. The project, for which $1,500,000 was allotted, calls for the construction of 304 living units in 3-story apartments and 2-story group houses. Foundation construction on the Evansville, Ind., project will be done by A. G. Ryan & Sons Construction Co., Chrisney, Ind., which submitted a bid of $70,335.85. This project, for which $1,000,000 has been allotted, is to house 195 families in 1- and 2-story group houses and flats.

Bids will be opened on June 2 for the superstructure contract on Dixie Homes, one of the two slum clearance projects in Memphis, Tenn. Contract for construction of foundations was awarded on April 10 to the S & W Construction Co., Memphis. Lauderdale Courts, the other Memphis project, is also entering the construction stage. The Dixie Homes project will provide living quarters for 743 families.

Vancouver Suspension Bridge Approved by Government

Approval has been granted on plans for a suspension bridge across the First Narrows, entrance to the harbor at Vancouver, B. C. The cost of the bridge is estimated at about $6,000,000 and it is to be built by private interests. The central suspension span is to be 1,500 ft. long, with a vertical clearance of 200 ft. The two approach spans are each to be 575 ft. long. A 2,900-ft. viaduct will serve as an approach to the north end of the bridge. The bridge will span the First Narrows near Prospect Point and will connect with an extensive residential area on the North Shore.

The bridge will be built for the British Pacific Properties, Ltd. W. G. Swan, Vancouver, is engineer, and Montsarrat & Pratley, Montreal, are consultants. Plans are expected to be ready sometime in August.

Congress Acts on Bills Of Engineering Interest

Among the legislation that has come up for Congressional action during the past week is a joint resolution allowing the states of New York and Vermont to amend the agreement between them relating to the Lake Champlain Bridge Commission. Sen. Sheppard introduced a bill that would allow any state to enforce its labor safety laws on any federal building within that state. Authority for the Secretary of War to permit the city of Buffalo, N. Y., to use the lands in the Black Rock Harbor improvement for sewage disposal facilities is included in a bill introduced by Sen. Copeland. Appropriation of $3,000,000 for the construction and operation of the Rio Grande canalization project is included in another Senate bill.

In the House, a bill introduced by Rep. Evans would give the Court of Claims jurisdiction over the claims of contractors for excess costs incurred in building the Mississippi River locks and dams. Another bill would amend the National Housing Act to allow the insurance of mortgages on manufacturing and commercial buildings. A measure sponsored by Rep. Healy provides for payments to states to reimburse them for taxes on PWA housing projects. A favorable report has been given on a bill making lands in drainage, irrigation and conservancy districts eligible for federal loans. Flood control measures in the Senate provide for preliminary surveys on the Sandusky River at Fremont, Ohio; Patuxent River, Md.; Sulphur River, Ark.; Congaree, Watere, Santee and Cooper rivers, S. C.; Blackstone, Seekonk, Moshassuk and Woonasquatucket rivers, R. I.

California Companies Plan For Power Interchange

Plans for the interchange of large blocks of power between the Southern California Edison Company and the Pacific Gas & Electric Company through revised and reinforced interconnections between the two systems were announced April 23 by Fred B. Lewis, vice-president and general manager of the Edison Company, and P. M. Downing, vice-president and general manager of the Pacific Gas & Electric Company.

Completion of the interconnections, set for July of next year, will provide for the ready absorption into the Edison system of a large portion of its allotment of power from Boulder Dam when the company's contract with the government becomes operative. The project removes the possibility of surplus generating capacity formerly faced by the Edison Company and obviates the necessity of either of the two companies making further capital investments in plant capacity while either has any surplus capacity which can economically be transferred through the new interconnections. The Edison Company will be enabled to utilize Boulder Dam power in its Southern California system, thus making available to the Pacific Gas & Electric Company a portion of the generating capacity of the Edison Company Big Creek-San Joaquin River plants.

Dawson Becomes Dean Of Engineering at Iowa

F. M. Dawson, professor of hydraulic and sanitary engineering, University of Wisconsin, has been made dean of the civil engineering department, State University of Iowa, to take office July 1. Since C. C. Williams left to become president of Lehigh University, Prof. B. J. Lambert has been acting dean at Iowa. Prof. Dawson, a native of Nova Scotia, was graduated in 1910 as a civil engineer from Dalhousie University and Nova Scotia Technical College. In 1913 he was given a master's degree in civil engineering at Cornell University. His early work was in railroad and dock construction and municipal work up to 1915 when he entered the War as captain and adjutant in the Eighth British Engineers, Military Forces of Canada. From 1919 to 1921 he was director of Super Cement America, Ltd., and for two years following was assistant professor at Cornell.

Bill Would Provide for Buffalo Slum Razing

A bill to amend the charter of the city of Buffalo, N. Y., to provide legal means for demolition or reconstruction of slum areas in the interest of public health and safety, was passed by the New York State Assembly on May 6. The bill had been passed by the Senate on March 2, but because it had been amended in the Assembly it was returned to the Senate for compliance. It is expected that the bill will be signed by Gov. Lehmann.

Challenges Company's Right To Question Power Loans

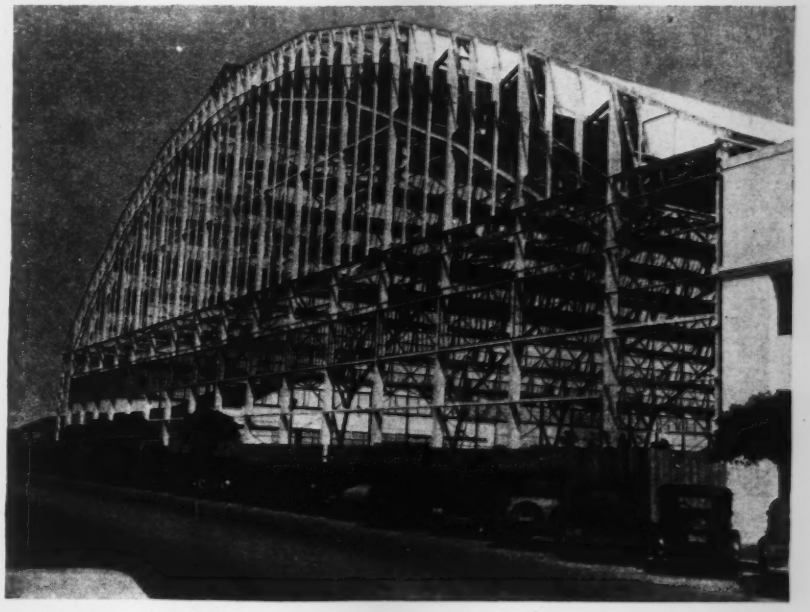
Government attorneys have filed with the U. S. Supreme Court a brief challenging the right of the Duke Power Co. to question PWA loans and grants for municipal power plant construction in the company's suit against Greenwood County, S. C. The brief, submitted by Solicitor-General Stanley Reid, conceded the public importance of a ruling on the question, but contended that the issue is not properly raised in this case.

Meanwhile, in the District of Columbia Supreme Court, argument was resumed in the consolidated case brought by five Texas, Oklahoma and Alabama utility companies against ten PWA loans and grants for power purposes. The case had been suspended for a week due to the illness and death of the wife of the Justice.

In an additional and similar case in the same court, in which five Nebraska utilities are attacking federal aid to three public power and irrigation districts, the government requested a postponement until next October, when a final ruling could be expected on one of the two other cases.

BUILDING FOR FUTURE GIANTS OF THE AIR

Foreseeing airplanes with a 200-ft. wingspread as a distinct possibility within the next five years this hangar in Santa Monica, Calif., for the Douglas Aircraft Co., Inc., has been designed with a doorway 250 ft. wide and 35 ft. high. The building is 300 ft. long, 285 ft. wide and 93 ft. high. Nine hundred tons of steel will be used in the hangar.



Brief News

BIDS have been asked for the first sections of a program of hard surfacing 420 mi. of highway in the province of New Brunswick, Can. The mileage selected for treatment includes a major part of the trans-Canada highway through this province. 330 mi. of permanent paving is included, and 90 mi. of carpet coating.

THE FEDERAL POWER COMMISSION on April 30 held a hearing on the license applications of the White River Power Co., a subsidiary of the Arkansas Power and Light Co., to construct three dams on the White River, and of the Current River Power Co., an independent utility, to build three dams on the Current River, in Arkansas and Missouri. In each case work would be started on at least one dam within two years of the granting of the license. Opposition to the proposals was limited to a written protest by the White and Black River Flood Control Association and to Rep. John E. Miller, of Arkansas, who stated that he would not oppose prompt construction of the projects but wished to be on record as opposing any long delay.

STRAIGHT, SMOOTH DETOURS around highway construction is the objective of the New Jersey highway commissioner, who recently ordered the contractor in charge of a detour on route 4, to smooth the surface of the detour and to place electric lights along the route. The commission feels that motorists are paying heavy taxes and are entitled to such safeguards.

MODELS of proposed flood walls along the Monongahela and Allegheny rivers in the Point District of Pittsburgh, Pa., are to be constructed with an appropriation of $2,500,000 made available by the Allegheny County Commissioners. The models are to be constructed in the hydraulic laboratories of the Carnegie Institute of Technology.

Increase Expected in Prices Of Finished Steel

An increase amounting to $2 or $3 per ton in the price of finished steel products, during the third quarter of this year, is reported as being predicted by various steel company executives. The higher price is held to be necessary because of higher labor costs and heavier taxes. It is held that the giving of paid vacations to steel workers, a plan adopted by many companies, will add from $6,000,000 to $9,000,000 to yearly payrolls. Provisions of the Social Security Act are expected to add between $30,000,000 and $50,000,000 during its first year of operation. Federal, state and municipal taxes are expected to be increased, further necessitating an increase in prices.

Los Angeles County Plans for Conservation Commission

The board of supervisors of Los Angeles County, California, has ordered the preparation of an ordinance which would provide for the organization at an early date of a special county commission to make a study of flood control problems, forestry and water conservation. The proposed commission would be comprised of seven members including the chief engineer of the county flood control district and the chief county fire warden and forester. Such a commission is needed, it was declared, to develop a coordinated plan for Los Angeles county, to safeguard industrial and residential property from fire and floods and for the conservation of water for future needs.

SOCIETY CALENDAR

AMERICAN WATER WORKS ASSOCIATION, annual meeting, Los Angeles, Calif., June 8-12.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, semi-annual meeting, Dallas, Tex., June 15-20.

INTERNATIONAL CONFERENCE ON SOIL MECHANICS AND FOUNDATION ENGINEERING, Cambridge, Mass., June 22-26, 1936.

SOCIETY FOR PROMOTION OF ENGINEERING EDUCATION, annual meeting, Madison, Wis., June 23-26.

HIGHWAY SAFETY CONFERENCE, Ames, Iowa, June 29-July 2.

AMERICAN SOCIETY FOR TESTING MATERIALS, annual meeting, Atlantic City, N. J., June 29 to July 3.

CANADIAN GOOD ROADS ASSOCIATION, annual meeting, Charlottetown, P.E.I., September 1-3.

THIRD WORLD POWER CONFERENCE, Washington, D. C., September 7-12.

PUBLIC WORKS CONGRESS, joint meeting, AMERICAN SOCIETY OF MUNICIPAL ENGINEERS AND INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, Toronto, Ont., September 28-30.

AMERICAN SOCIETY OF CIVIL ENGINEERS, regional meeting, Columbus, Ohio, May 15-16.

NEW YORK STATE SOCIETY OF PROFESSIONAL ENGINEERS, annual meeting, New York City, May 23.

NEW JERSEY SECTION, AMERICAN WATER WORKS ASSOCIATION, inspection of Wanaque Reservoir; guest speaker, Prof. L. V. Carpenter, May 27.

ILLINOIS ASSOCIATION OF SANITARY DISTRICTS, annual meeting, Urbana, Ill., June 11-12.

FOUR STATES SECTION, AMERICAN WATER WORKS ASSOCIATION at its annual meeting in Baltimore, April 23-24 elected the following officers: chairman, E. B. WHITMAN; vice-chairman, H. M. FREEBURN; secretary-treasurer, C. A. HECHNER.

Personals

A COMMUNICATION for E. Lowell Delaney, formerly of 1,511 Franklin St., Boise, Idaho, has been received at this office. Mr. Delaney is requested to get in touch with the editors of this magazine.

JOHN W. RAYMOND, JR., of the engineering staff of Metcalf & Eddy, Boston, Mass., has been appointed superintendent of public works for the town of Lexington, Mass., succeeding ROBERT P. TRASK. Mr. Raymond took office on May 11. He is a graduate of Massachusetts Institute of Technology, and was previously connected with the city engineering department at Lynn, Mass., and with H. K. Barrows, Boston.

RAYMOND L. WHANNEL has become assistant engineer in the bureau of bridges, of the Illinois State Highway Division. He resigned as chief clerk of the Springfield City Water, Light and Power Department, to take the engineering post. Mr. Whannel has also served as research assistant at the Iowa Engineering Experiment Station.

R. C. BOOTH, for the past three years division engineer, Metropolitan Water District of Southern California, has become general superintendent and division engineer of the Coachella Division. Prior to his work with the Metropolitan Water District, Mr. Booth had been construction superintendent at Madden Dam, and for the Southern California Edison Company on the hydro-electric development at Big Creek.

RALPH H. BURKE, chief engineer, Chicago Park District, temporarily serving as WPA deputy state administrator for Illinois, has returned to his position with the park district.

STEPHEN H. SMITH has been appointed by the PWA to the post of project engineer on the Loup River public power project in Nebraska. HARRY NELSON, active project engineer for PWA on both the Loup and the Platte Valley projects, will continue in charge of the Platte project, now nearly completed. Mr. Smith has been chief PWA examiner in Massachusetts, and previous to his government work was associated with Stone & Webster for many years.

P. O. PENNELL, chief engineer for the Southwestern Bell Telephone Co., St. Louis, Mo., retired from that position on May 1. He will be succeeded by BLAKE D. HULL, who is now engineer for the company in the Texas territory. In 1912 when the Missouri and Kansas Telephone Co. became a part of the Southwestern Bell system Mr. Pennell became general building and equipment engineer, and was advanced to chief engineer in 1918.

ALBERT KAUFMANN, vice-president, in charge of the Chicago plant of the Link Belt Co., has been made president, a position he held for eight years ending 1932. He is a graduate of Stevens Institute and started as a draftsman with the company 35 years ago, and was successively designing engineer, superintendent of construction, sales official and vice-president of different plants.

FRANK H. LUBBE has been appointed superintendent of public works, Malverne, N. Y.

JOHN R. ROCHART, a former associate of the late Cass Gilbert, architect, has established his own architectural offices in New York City.

ARTHUR E. HILLIARD, for a time with the Reliance Advertising Co., and formerly shaft engineer for the Board of Water Supply, New York City, has become an assistant engineer with the Department of Hospitals, New York City.

Appointment of E. E. MASHBURN as chief construction engineer for the Arkansas State Highway Department has been announced. He succeeds the late O. L. HEMPHILL. Mr. Mashburn has been connected with the department for some time as a construction engineer.

GUY C. EMERSON, for the past 25 years consulting engineer of the Boston Finance Commission has been retired from the service on a pension.

Obituary

J. EDWARD MCLEAN, a prominent contractor of Somerville, Mass., died suddenly of a heart attack at Narragansett, R. I., on May 6. He was 63 years of age.

WILLIAM H. ADAMS, president and general manager of the Adams Brothers Contracting Co., died at his home in Zanesville,

Ohio, May 7. He was 72 years of age.

A. STANTON ZINN, consulting engineer, Los Angeles, Calif., and former resident engineer of the Fourth Division of Panama Canal, died in South Bend, Ind., on May 7. Mr. Zinn was 72 years old at the time of his death. Mr. Zinn was educated at Rose Polytechnic Institute, later becoming chief draftsman of the Elgin, Joliet & Eastern Ry. From 1892 to 1895 he was in private practice. In 1895 he returned to railroad work as assistant engineer of maintenance of way for the Vandalia R.R. He later spent three years with the Chicago & Western Indiana R.R. as assistant engineer on track elevation and then for two years was division engineer with Chicago, Rock Island & Pacific Ry., later becoming principal assistant engineer at Oklahoma City. In 1906 he became resident engineer on the Culebra Cut of the Panama Canal. In 1914 he became consulting engineer for the Republic of Panama, and held this position until 1916, when he returned to the United States, later becoming associated with the U. S. Railroad Administration and the Missouri Pacific R.R.

J. HUGHES RICE, 57, assistant instructor in the College of Engineering at the University of Kentucky, Lexington, for twenty years, died at his home there on May 6.

WILLIAM C. LOREE, retired civil engineer, died in New York City, May 7, at the age of 75. Mr. Loree began his railroad work in 1883 on the Pennsylvania Lines, west of Pittsburgh. In 1889 he was appointed engineer of maintenance of way of the Chicago division and then to a similar place on the Indianapolis division. He later became superintendent of the Indianapolis division and in 1902 became superintendent of the Chicago division of the Baltimore & Ohio R.R. In 1903 he became general superintendent of the Baltimore & Ohio at Pittsburgh and two years later was transferred to the Wheeling system where he remained for five years. He then became general manager of the Cincinnati, Hamilton & Dayton R.R.

LOUIS H. MCALOON, a well known New England contractor for the past 38 years, died at his home in North Andover, Mass., on April 27 at the age of 61.

CONSTRUCTION STATISTICS FOR THE WEEK

ENGINEERING construction awards for this week total $30,257,000, of which $5,440,000 is for private construction and $24,817,000 for public. Of the public, $3,201,000 is federal and $21,616,000 state and municipal. Both private and state and municipal classifications are lower this week than last due to a dearth of large projects. Private awards this week are lower than for the corresponding week a year ago but public awards are more than double the volume last year. Corresponding values a year ago are: total, $21,680,000; private, $9,688,000; public, $11,992,000; federal, $1,461,000; state and municipal, $10,531,000.

Sewerage awards and earthwork, irrigation and drainage are both higher this week, but other classes of work are lower. The volume for the week by classes of work is: sewerage, $2,931,000; earthwork, irrigation and drainage, $2,490,000; industrial buildings, $1,492,000; commercial buildings, $3,287,000; public buildings, $4,101,000; bridges, $2,366,000; streets and roads, $9,269,000; waterworks, $931,000; unclassified, $3,390,000.

The larger projects for the week include: hotel, Williamsburg, Va., $750,000; Horace Mann School at Pasadena Junior College, Pasadena, Calif., $589,000; highways by Connecticut, $918,000; by New York, $1,074,000; by Missouri, $559,000; by Kansas, $505,000; repaving highways and bridges damaged by flood, Clinton County, Lock Haven, Pa., $918,000; viaduct over Blue River, Kansas City, Mo., $536,000; superstructure for filter plant building, for water treatment plant, Milwaukee, Wis., $326,000; Upper Des Plaines Intercepting Sewer, Chicago, Ill., $1,260,000; North Side treatment works, Division "A," Chicago, Ill., $369,000; cement for Hamilton and Arnold Dams, Colorado River Project, Bureau of Reclamation, Tex., $835,000; Caballo Dam on Rio Grande River, N. Mex., $957,000; swimming pool and bathhouse, Bradhurst Ave. and West 146th St., relief labor, New York City, $1,000,000; airport for city, Dayton, Ohio, $570,000.

New capital includes state and municipal bond sales, $10,148,000 and corporate securities, $7,838,000.

CONTRACTS
(Thousands of Dollars)

	Weekly Average May 1935	Prev. 4 Weeks	Week May 14, 1936
Federal Government	$4,057	$1,872	$3,201
State and Municipal	12,172	23,478	21,616
Total public	$16,229	$25,350	$24,817
Total private	8,336	14,932	5,440
Week's total	$24,565	$40,282	$30,257
Cumulative to date:			
1935...$481,764,000	1936...$865,925,000		

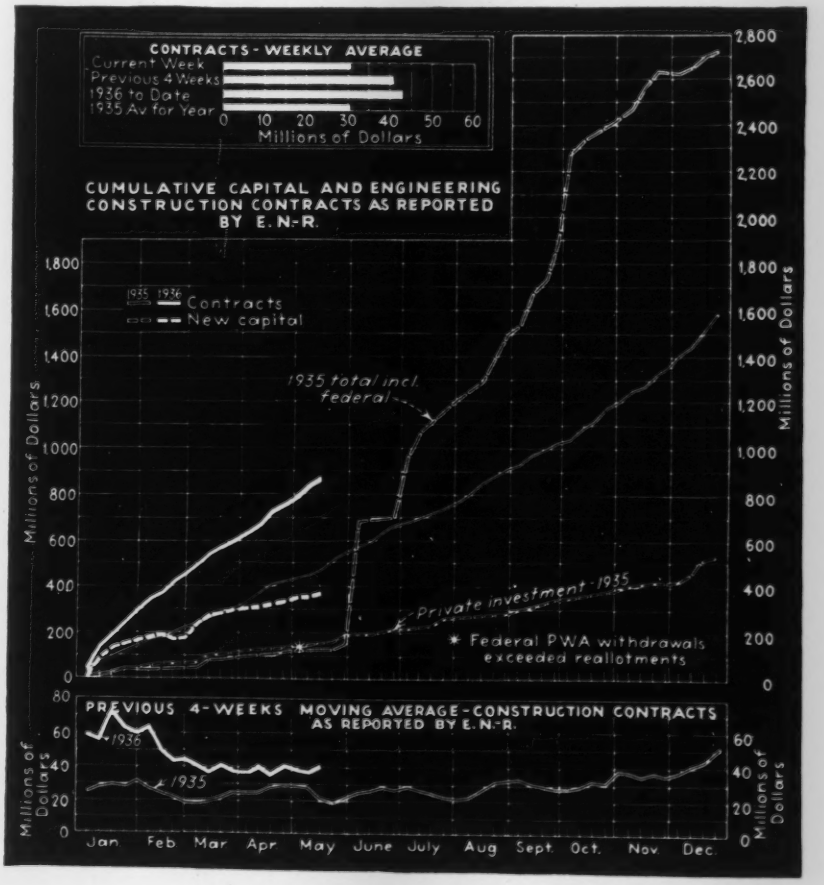
NEW PRODUCTIVE CAPITAL
(Thousands of Dollars)

1936	Week May 14	Cumulative
State and municipal	$10,148	$199,230
PWA non-federal	....	40,547
RFC loans	....	37,008
Corporate issues	7,838	90,072
PWA loans, Private	....	1,270
Total Non-Federal	$17,986	$368,127
Federal	....	4,955
Total new capital	$17,986	$373,082
Cumulative to date:		
1935...$131,533,000	1936...$373,082,000	

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for federal construction, deficiency act funds. An arbitrary percentage (25%) of the WPA allotments and local contributions to WPA work is included to allow for the capital additions through the Works Progress Administration division of the new program.

INDEX NUMBER

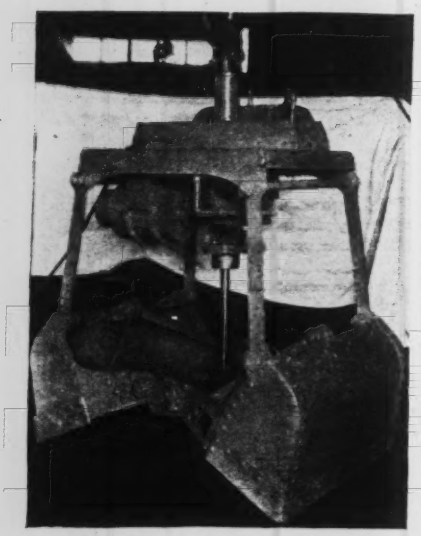
ENR Cost	1913 = 100	1926 = 100	ENR Volume	1913 = 100	1926 = 100
May, 1936	203.40	97.77	Apr., 1936	166	73
Apr., 1936	202.20	96.71	Mar., 1936	160	70
May, 1935	194.06	93.28	Apr., 1935	130	57
1935 (Av.)	195.22	93.84	1935 (Av.)	135	58
1934 (Av.)	198.10	95.23	1934 (Av.)	114	50
1933 (Av.)	170.18	81.80	1933 (Av.)	102	47



Construction Equipment and Materials

Hydraulic Clam Shell Bucket

A clam shell bucket, operated by a motor-driven fluid pump, controlling a hydraulic ram, has been developed by the Hayward Co., New York City. Opening and closing of the bucket is done by an electric motor, which is controlled from the operator's cab, and which activates the



hydraulic ram, which, in turn opens or closes the jaws of the bucket. No closing line or winding drum is required when this type of bucket is used. The electro-hydraulic unit is self-contained and is fastened compactly to the rectangular frame.

Disc Grader Attachment

A set of discs which may be attached to any grader or motor patrol has been developed by the Baker Manufacturing Co., Springfield, Ill. The disc grader attachment clamps on the grader moldboard, thus eliminating the necessity of removing the

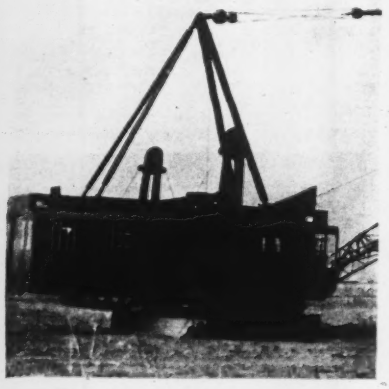
moldboard. Adjustable features of the scarifier allow it to be mounted on any grader regardless of the height of the moldboard. The spacing of the discs may be quickly changed by merely dropping off or adding on discs to the disc axle.

Cable Operated Scraper

A single-cable scraper for use with tractors of from 35 to 50 hp. has been developed by the Austin-Western Road Machinery Co., Aurora, Ill. The scraper pan does not dig at an angle as the front and rear of the pan are in the same plane while digging. The wheels are placed so that they travel within the 6-ft. cut of the scraper instead of on either side of the cut. Digging, carrying, and dumping are controlled through a single cable mounted on a vertical winch which requires no fairlead and which is automatically locked in place when the clutch is in neutral. The scraper cuts to a depth of 6 in. and spreads a load evenly to any depth up to 9 in.

Walking Dragline

A new type walking dragline, in sizes ranging from 2½ to 20 cu.yd. capacity, is now being built by the Page Engineering Co., Chicago, Ill. The series "600" walkers are of the two-shoe type. The walking mechanism is based on a crank action principle which, by means of a direct drive from the engine to the cranks attached to the side-mounted shoes, lifts and slides the



machine at the rate of three 6-ft. steps per minute. When the machine is digging, the shoes are held above the ground by an automatically set brake.

Controlled Combustion Diesels

A compression ignition diesel engine, operating at cylinder pressures not much greater than those occurring in gasoline engines, is being made by the Buda Co., Harvey, Ill. The Buda-Lanova diesel makes use of a cylinder head with an auxiliary air chamber developing a compression ratio between 12.5 to 1 and 13.2 to 1 with maximum pressures of not over 625 lb. per sq.in. The controlled combustion principle is said to result in lower fuel costs, cleaner combustion, smoother operation and lower exhaust temperatures. The Buda-Lanova model 909 is a 6-cylinder engine with 909 cu.in. displacement.

New Equipment in Brief

Portable Drinking Fountain. A portable bubble type drinking fountain for supplying water under sanitary conditions to construction crews is now being manufactured by the Dobbins Manufacturing Co., North St. Paul, Minn. The tank is made in 4 gal. capacity of galvanized metal, and is equipped with a handle for easy carrying. The cover, on which is fastened a glass bubbler, clamps to the tank and forms a seal to hold air pressure which is built up by a small hand pump attached to the tank.

Luminous Marble. Marble cut in panels that have the ability to transmit light, making possible new decorative effects is being produced by the Vermont Marble Co., Proctor, Vt. Lumar, as the new development is called, is supplied in six varieties. The panels are furnished in thicknesses of ¼, ½ and ¾ in. The panels, which have a high diffusion quality and high efficiency of reflected light, are applied in the same manner as glass panels.

Tire Combination Guide. A newly designed tire calculator for 1½ ton trucks and a guide for tire combinations on 1-ton and larger trucks have been published by the B. F. Goodrich Co., Akron, Ohio.

The tire calculator allows any one to determine the probable life of his present tire equipment, the size tire to be used for 100 per cent normal service expectancy, and actual truck tire costs.

New Publications

SUBGRADE DRAINAGE FOR MODERN ROADWAYS, Armco Culvert Manufacturers Association, Middletown, Ohio. 6x9, 32 pages. Bulletin H-36.

INSTRUMENTS FROM THE EXECUTIVE VIEWPOINT, Brown Instrument Co., Philadelphia, Pa. 7x10, 24 pages.

GLORIFIED LIGHT, Pittsburgh Plate Glass Co., Pittsburgh, Pa. 8½x11, 32 pages.

JUNIOR SCOUT DRILL, E. J. Longyear Co., Minneapolis, Minn. 8½x11, 4 pages. Bulletin 48.

THE BIN-DICATOR, Bin-Dicator Co., Detroit, Mich. 3½x9, 6 pages.

MECHANICAL STRIKE-OFF, Ransome Concrete Machinery Co., Dunellen, N. J. 8½x11, 4 pages.

ADSCO PRODUCTS, American District Steam Co., North Tonawanda, N. Y. 8½x11, 122 pages. Catalog No. 35.

SEALED JOINT GLASS CONSTRUCTION, Sealed Joint Products Co., New York, N. Y. 8½x11, 22 pages.

WELDING AND CUTTING HIGH CHROMIUM STEELS, Linde Air Products Co., New York, N. Y. 8½x11, 8 pages.

PNEUMATIC SPONGE, Byron Jackson Co., West Berkeley, Calif. 8½x11, 4 pages.

CARRYALL SCRAPERS, R. G. LeTourneau, Inc., Peoria, Ill. 8½x11, 15 pages.

THE SUPERSLEEVE, Beaton & Corbin Mfg. Co., Southington, Conn. 8½x11, 4 pages. Pipe sleeves.

Business Notes

PACIFIC FLUSH-TANK CO., Chicago, Ill., announces the election of the following officers: president, Lester E. Rein; vice-president, Harry E. Schlenz; treasurer, D. M. Burwell; secretary, L. E. Langdon.

INLAND STEEL CO., Chicago, Ill., has added to its Chicago sales office Norbert E. Smith, formerly with Joseph T. Ryerson & Son, Inc.

REPUBLIC STEEL CORP., Cleveland, Ohio, has appointed the following distributors: Equitable Equipment Co., Inc., New Orleans, La.; The York Corrugating Co., York, Pa.; Sheet Metal Manufacturing Co., Inc., Stamford, Conn.

THE WISCONSIN DRAINAGE CO., Elkhorn, Wis., announces the death of its secretary and treasurer, James L. Stokes.

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis., has elected Walter E. Hawkinson as secretary to succeed the late Raymond Dill.

ROLLER-SMITH CO., New York City, has appointed the following sales representatives: George W. Burnes, Buffalo, N. Y.; J. J. Cassidy, Malden, Mass.; Goodyear and Hammersley, Inc., New York City.

THE MORSE CHAIN CO., Ithaca, N. Y., has added G. E. Olmstead, New Haven, Conn., to its New York sales office. Mr. Olmstead will continue to cover the state of Connecticut.

TRACTOR & EQUIPMENT CO., Chicago, Ill., has opened a new building at 433 South Jefferson St. for the display of tractors and construction machinery.

THE BRISTOL CO., Waterbury, Conn., has appointed L. E. Mustard as district manager of the Detroit, Mich., branch office.

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

N. Y., Binghamton — City plans connecting city watermains with those of Johnson City, incl. constructing 8 in. watermains at Riverside Dr. and Burkan Ave. connection at Highland Ave. and Margaret St.; in Floral and Burbank Aves.; 4 in. line at Grand and Carhart Aves.; and at Mildred and Farr Aves. J. A. Giles, city engr. Owners will purchase pipes, valves and appurtenances. To exceed $23,000.

N. Y., Chester—Village plans addition to water supply, incl. 5 mi. c.i. pipe and construction storage tank, $17,000. R. R. Shearer, 91 North Pearl St., Albany, engr.

N. Y., Old Forge—Village plans repairing water system, incl. repairing reservoir watermains, etc. To exceed $23,000.

N. C., Valdese—Town filed application with P.W.A. for loan and grant to finance construction of water and sewerage systems, $103,454. L. Butler, Valdese, mayor.

O., Steubenville—Jefferson Co. soon takes bids water line from west Steubenville city limits to Wintersville. E. W. Martin, Steubenville, engr.

S. D., Salem—City, C. H. McCoy, aud., plans installing filtration plant at city waterworks.

R. I., Burrillville—Town, Pascoag Fire Dist., Burrillville, plans water supply system, $200,000. P.W.A. project. Jenks & Ballou, 2600 Industrial Trust Bldg., Providence, consult. engrs. Noted Feb. 2, 1934, C. D.—Feb. 8, 1934, E. N.-R.

S. D., Rapid City—City voted $90,000 bonds for water system improvements, drilling new well, constructing pipe line, furnishing, installing valves and fittings, building pump house, $100,000. H. W. Zolpher, city engr. Noted Mar. 27, C. D.—Apr. 2, E. N.-R.

Tenn., Lenoir City—City abandoned for the time being plans for waterworks extensions and improvements, $94,545. P.W.A. project. Noted Nov. 19, C. D.

Tex., Port Arthur—Pear Ridge Community plans waterworks system improvements, extension of mains, fire hydrants, improvements to pumping unit. Bonds voted. Est. $25,000. S. M. Yates, mgr.

Wash., Spokane—City plans installing 35 new water hydrants, $6,602. A. D. Butler, City Hall, engr.

Ont., Pickering—Ratepayers will vote soon on drilling deep well, $28,850; and collecting system, $25,000. Wynne Roberts & Son, and McLean, 36 King St., Toronto, consult. engrs. Noted Jan. 29, C. D.—Feb. 6, E. N.-R.

★ **Que., Montreal**—Dpt. P. Wks., J. E. Blanchard, dir., by-laws approved and money voted for 1936 construction waterworks improvements, $447,000; waterworks enlargement, $1,600,000.

Que., Montreal—Municipality voted $154,500 for repairs to hydrants and filtration stations during 1936, also $15,000 for additional street lamps.

BIDS ASKED

Md., Sharptown—Town Comrs., bids about May 29, pumping station and equipment, $47,000. C. Gardner, Salisbury, consult. engr.

Mass., Cotuit—May 26, by Cotuit Fire Dist., Bd. Water Comrs., and Prudential Com., Freedom Hall, Main St., constructing pumping station, furnishing, laying 8 mi. c.i. watermains together with hydrants, valves, house services, etc., construction of steel elevated tank, furnishing pumping equipment and appurtenances, $130,000. P.W.A. project. Whitman & Howard, 89 Broad St., Boston, engrs. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

Mass., Leominster—May 18, by Town, Bd. Water Comrs., Municipal Bldg., furnishing plumbing fixtures and equipment, domestic water supply pumping unit, filter sand, steam heating equipment for new pumping station under construction. Metcalf & Eddy, 1300 Statler Bldg., Boston, engrs. To exceed $1,000.

Mass., Needham—May 26, by Town, Bd. Selectmen, Town Hall, L. C. Hollis, supt. P. Wks., constructing gravel packed well on Charles River St., in connection with water suppy system now under construction. X. Henry Goodnough, Inc., 14 Beacon St., Boston, engrs.

Miss., Belmont—May 27, by Mayor and Bd. Aldermen, waterworks system, incl. gravel wall well system, general contract, incl. distribution system, elevated tank and pumping station. Est. $32,946. P.W.A. project. Totten & Loving, Birmingham, Ala., engrs. Noted Sept. 19, C. D.—Sept. 26, E. N.-R.

N. Y., New York—May 26, by Bd. Water Supply, 346 Bway., making test borings in Gardiner, Plattekkill and Marlboro, Ulster Co.; Newburg, Orange Co.; Wappinger, Fishkill and West Fishkill, Dutchess Co.; Putnam Valley and Kent, Putnam Co., on land and in Hudson River, along proposed Rondout-West Branch Tunnel of Delaware Aqueduct, Contr. 331. Bids Apr. 28 rejected. Noted Apr. 29, C. D.—Apr. 16, E. N.-R.

N. Y., Oneonta—See "Contracts Awarded."

N. Y., Palmyra—Village bids about May 30, constructing water filter for waterworks, $50,000. W. Lozier, Inc., 10 Gibbs St., Rochester, engr.

Pa., Allentown—May 19, by M. W. Gross, mayor, constructing South Mountain Reservoir (Lehigh Mountain), to have a capacity of 30,000,000 gal., 278x556 ft., incl. 18,000 yd. cement, 3,000,000 lb. steel; constructing reservoir in 14th Ward, to have capacity of approximately 10,000,000 gal., 178x378 ft., incl. 7,600 yd. cement, 1,500,000 lb. steel; furnishing, installing electrical wiring and lighting for both above units. Morris Knowles, Inc., Westinghouse Bldg., Pittsburgh, engrs. Noted Apr. 21, C. D.—Apr. 23, E. N.-R.

Pa., Oil City—See "Contracts Awarded."

Wis., Elkhart Lake — May 23, by Village, pumping station and pumping equipment. Bids Apr. 22 rejected. J. Donohue Eng. Co., Sheboygan, engrs. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

Wis., Madison—May 20, by Bd. P. Wks., boiler accessories for water purification plant, P.W.A. project.

CONTRACTS AWARDED

Calif., Los Angeles—American States Water Service Co., 1206 South Maple Ave., constructing 250,000 gal. steel tank on 140 ft. tower, 7806 Miramonte Blvd., to Chicago Bridge & Iron Wks., 608 South Hill St., about $26,000.

Ill., Beckemeyer—City, constructing waterworks and distribution system, incl. supply, pumps, tank on tower, distribution mains, etc., to Stiers Bros. Constr. Co., 2944 Magazine St., St. Louis, Mo., $58,195. Bids Nov. 30. **P.W.A.** Noted Dec. 10, C. D.

Ill., Carlyle—City, T. H. Gross, mayor, waterworks and distribution system, incl. wells, pumps, tank on tower, distribution mains, fire hydrants, etc., to A. F. Kralls & Co., Decatur, approximately $75,000. Est. $70,909. **P.W.A.** Bids Dec. 13. Noted Dec. 9, C. D.

Ill., Louisville—Bd. Village Trustees, filtration plant and pump house, to C. J. Moritz, Effingham, $32,492•••distribution mains, fire hydrants, etc., to E. M. Scheflow, Elgin, $23,978•••elevated tank, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, Ia., $4,150. Grand total $60,620. Bids Dec. 12. **P.W.A.** Noted Dec. 5, C. D.

Mass., Athol — Town, Bd. Water Comrs., Memorial Bldg., furnishing, laying 8,900 ft. c.i. water pipe and appurtenances, to Louis Balboni, Inc., 78 Metropolitan Ave., Roslindale, $27,604. **P.W.A.** Bids Apr. 9. Noted Apr. 20, C. D.—Apr. 9, E. N.-R.

Mass., Boston—Commonwealth of Massachusetts, Metropolitan Dist. Comn., Water Supply Division, R. N. Molt, secy., F. E. Winsor, ch. engr., constructing ashlar masonry service building and head house at Shaft 12 of Quabbin Aqueduct, Greenwich, to V. Caira, 517 California St., Newton, $34,990; ashlar masonry head house at Shaft 9 of Quabbin Aqueduct, Barre, to English Constr. Co., 157 Plain St., Lowell, $9,300. Bids Apr. 17 and Apr. 24, E. N.-R. Noted Apr. 23 and May 4, C. D. and Apr. 9 and 16, E. N.-R. under Boston and Barre respectively.

Mass., Quincy—City, E. C. Sargent, comr. P. Wks., City Hall, constructing 2 m.g. steel standpipe, to Pittsburgh-Des Moines Steel Co., 270 Bway., New York, $44,600. **P.W.A.** Bids Apr. 28, awarded May 1. Noted May 7, C. D.—Apr. 16, E. N.-R.

Neb., Ericson—City, fire hose and play pipes, to Eureka Fire Hose Co., 9th and Douglas Sts., Omaha, $431•••electric fire alarm system, to Graybar Electric Co., 1120 Capitol St., Omaha, $320•••pipe line and pump house construction, to Weidenhaft & Hoepener, Ericson, $4,302. Grand total $5,053. Est. $5,913. **P.W.A.** Bids Apr. 23.

Nev., Caliente—Town Bd., replacing and extending distribution system, also replacing supply line, constructing new pumping plant, to Mullins & Wheeler, 22½ East First So. St., Salt Lake City, Utah, $14,000. Part of $50,000 P.W.A. project for waterworks and sewer improvement project. Bids Apr. 17. **P.W.A.** A. A. Barr, Caliente, engr. Noted Apr. 7, C. D.—Apr. 9, E. N.-R.

†**N. J., Lake Denmark**—Yards & Docks, Navy Dpt., Wash., D. C., improving water system, to I. Aronson, Inc., 228 Bidwell Ave., Jersey City, $18,885. (120 days.)

†**N. Y., Canandaigua**—Werner Spitz Constr. Corp., general contractors, Comfort St., Rochester, steel for water softening plant at Veterans Hospital, for U. S. Govt., Veterans Administration Bldg., Wash., D. C., to Guarantee Iron Wks., 16 Railroad St., Rochester; millwork, to Stevens & McMiller, 1965 East Ave., Rochester. Noted Apr. 17, C. D.—Apr. 23, E. N.-R., under "Contracts Awarded."

N. Y., Oneonta—City, cleaning filtration plant, lowering reservoir and dredging channel, relief labor. To exceed $23,000. **W.P.A.** A. Calabriso, Telephone Bldg., Oneonta, procurement officer W.P.A., will purchase materials. Noted Oct. 25, C. D.—Oct. 31, E. N.-R.

Ore., Salem—City Council, constructing 10 m.g. reservoir, to Kern & Kibbe, 42 Southeast Salmon St., Portland, $111,390•••pipes, valves, fittings, to H. G. Purcell Co., Colman Bldg., Seattle, Wash., $8,433•••to Consolidated Supply Co., Portland, $1,133•••to Rensselaer Valve Co., Seattle, $2,003, above work to be constructed on Stayton Island, 18 mi. southeast of here. Grand total $122,026. **P.W.A.** Noted May 6, C. D.—May 4, E. N.-R.

Pa., Falls Creek—Borough, 1,609 lin.ft. 8 in., 40 lin.ft. 12 in. and 78 lin.ft. 6 in. c.i. o terra cotta pipe line, to Minnis Bros., 611 1st St., DuBois, $5,250; 250,000 gal. capacity steel water tank, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., $4,485. Noted Mar. 24, C. D.—Oct. 24, E. N.-R.

Pa., Oil City—City, improving water supply and distribution system, involving laying two 12 in. mains across Allegheny River and erection of manhole on right bank of river opposite city, day labor under supervision of B. B. Webber, city engr. Noted Feb. 10, C. D.—Feb. 13, E. N.-R.

R. I., East Providence—Town, Bd. Water Comrs., J. V. Turner, supt. Hunts Mills, Rumford, painting steel standpipe on Pawtucket Ave., to J. H. Tredennick, 158 Walter St., Roslindale, Mass., $1,490. Bids Apr. 16, awarded Apr. 30.

Tex., Orange Grove — City, c/o A. Wendt, mayor, constructing waterworks system, incl. 100,000 gal. elevated tank on 100 ft. tower, two 25 hp. pumps, 18,000 ft. 4- to 6-in. c.i. mains, to Kelly Constr. Co., 606 West Summit St., San Antonio, $32,768. Est. $35,000. **P.W.A.** Noted Apr. 7, C. D.—Mar. 12, E. N.-R.

★ **Wis., Milwaukee**—City, constructing filter building superstructure for water purification plant, to Kroening Eng. Corp., 4500 West Mitchell St., $326,000. **P.W.A.** Noted Apr. 21, C. D.—Apr. 23, E. N.-R.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Conn., Norwalk—City, Planning Comn., Norwalk, plans drawn up by E. Scofield, City Hall, engr., for incinerator for rubbish disposal, $25,000.

Ill., Belleville—City soon takes new bids constructing and equipping activated sludge type sewage disposal plant, extending present intercepting sewer about 500 ft. to connect with new plant, also new outlet branch sewer in Douglas St., new force main and lift station at 88th St., new outfall sewer to empty into Richland Creek. $434,545. $282,000 bond issue. Only 1 bid received Apr. 28, and same returned to bidder unopened. Noted Apr. 7, C. D.—Apr. 9, E. N.-R.

Md., Ocean City — City made plans sewage treatment plant, $110,000. Project pending P.W.A. approval. C. Gardner, Salisbury, engr.

Mo., St. Louis—PLANT—Atlas Tool Mfg. Co., 6319 Manchester Ave., plans brick, concrete plant addition, about 35,000 sq.ft. floor space, 5145 Natural Bridge Rd. Will spend about $25,000 for new equipment.

N. M., Ft. Sumner—City plans new sanitary sewerage system for town, $60,000 bonds voted Apr. 7.

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† *Federal Government*

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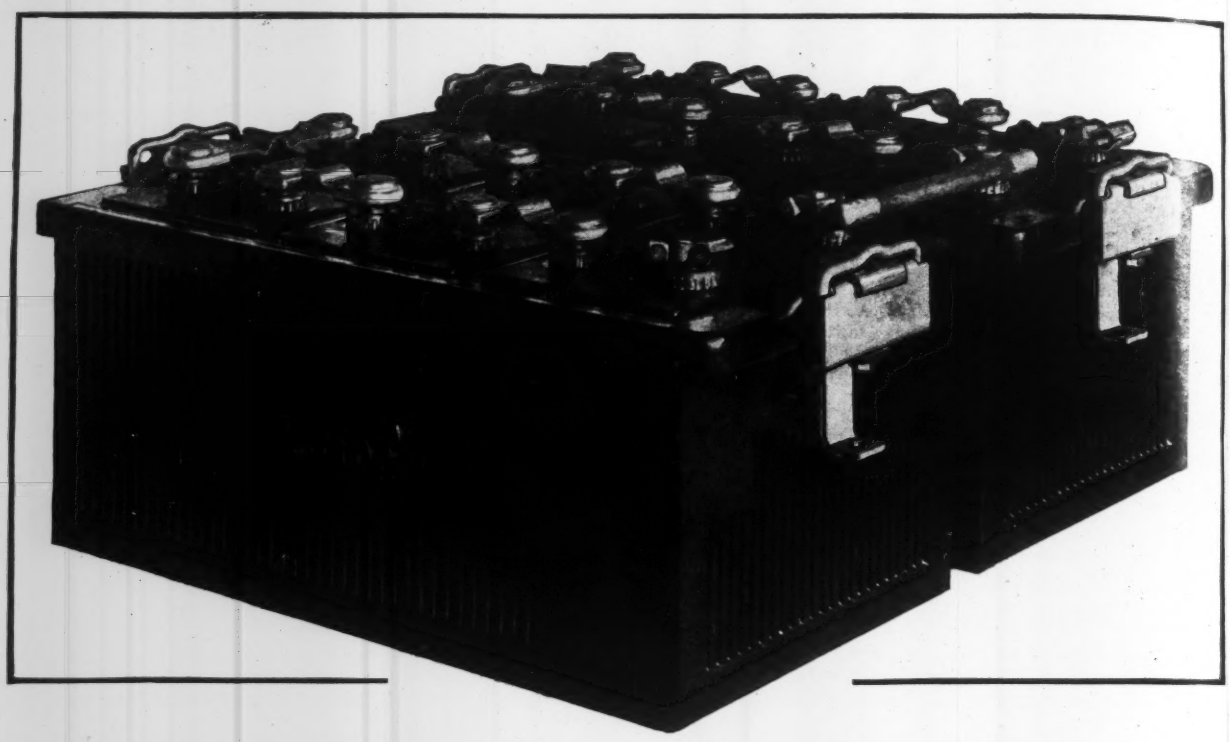

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sewerage, etc. (Continued)

N. M., Las Cruces—City voted $50,000 bonds for storm sewerage system. Est. $213,000. P.W.A. to furnish $163,000.

N. C., Crossnore—Town plans laying 6 in. sewer, septic tank, filter bed, etc. A. A. Johnson, mayor.

N. C., Valdese—See "Waterworks."

Tex., San Antonio—Bexar Co. Water Control & Improv. Dist. 5, L. G. Preston, mgr., voted $55,000 bonds to finance construction of sanitary sewers, incl. extension of system into outlying district, approximately 1¼ mi. 12- to 18-in. vitr. or concrete pipe. J. W. Beretta Engineers, Inc., National Bank Comm. Bldg., engrs. Noted Apr. 10, C. D.—Apr. 16, E. N.-R.

Wis., Cameron—Village, W. W. Pieper, surveyor ordered, may have election to authorize construction sanitary and storm sewerage system. $25,000 (not official). Banister Eng. Co., 556 Prior Ave. N., St. Paul, Minn., engrs.

★**Que., Montreal**—Dpt. P. Wks., J. E. Blanchard, dir., by-laws approved and money voted for 1936 construction sewage disposal plant north end, $700,000; Henri Julien Collector Sewer, $1,695,000; sewers, $600,000; conduits, $366,000.

BIDS ASKED

Ill., Collinsville—City bids about June 15, constructing 7,500 lin.ft. 15- to 21-in. intercepting sewers and sewage treatment plant, $161,000. P.W.A. project. Caldwell Eng. Co., Jacksonville, engrs. Noted Apr. 3, C. D.—Apr. 9, E. N.-R.

†**Miss., Greenville**—June 2, by U. S. Eng., Vicksburg, constructing outfall sewerage system. Noted May 1, C. D.—May 7, E. N.-R.

Mo., St. Louis—June 9, by Bd. P. Serv., City Hall, 2,070 lin.ft. 72 in. sewer, manholes, shafts, reducers and necessary appurtenances, $107,000. P.W.A. project. L. A. Pettus, city engr.

Mo., Webster Groves—May 22, by Webster Groves Sanitary Sewer Dist., constructing Sect. C, trunk line sanitary sewerage system, incl. 2,885 ft. 7 ft. horseshoe section, 3,615 ft. 6½ ft. horseshoe section, 700 ft. 6 ft. horseshoe shaped tunnel, with necessary transition section, junction, creek crossings, overflows, creek inlets and cutoffs, manholes and other appurtenances for complete sanitary sewer project along Deer Creek Valley, St. Louis County, extending from end of Sect. A, at Laclede Station Rd., to Lake line crossing west of Bompart Ave. $245,000. P.W.A. project. W. W. Horner, International Office Bldg., 722 Chestnut St., St. Louis, chief engr. Noted Mar. 17, C. D.—Mar. 19, E. N.-R.

N. Y., Baldwinsville — See "Contracts Awarded."

N. Y., Buffalo—May 26, by Buffalo Sewer Authority, City Hall, constructing storm water relief drains and sanitary sewers, Divs. G and I, P.W.A. project.

N. Y., New York—May 20 (extended date), by Dpt. Sanitation, 125 Worth St., heating and ventilating Contr. 15 and plumbing Contr. 17 for Manhattan Grit Chamber and heating and ventilating Contr. 16, and plumbing Contr. 18, for Bronx Grit Chamber, for Wards Island Sewage Treatment Works, Sect. 4, $90,000. P.W.A. and W.P.A. projects. Noted May 6, C. D.

N. Y., Port Dickinson — See "Contracts Awarded."

R. I., Newport—See "Contracts Awarded."

Wis., Green Bay—May 29, by Metropolitan Sewerage Comn., constructing intercepting sewers, Divisions D, E and J. P.W.A. project. J. Donohue Eng. Co., Sheboygan, engrs. Noted May 1, C. D.—May 7, E. N.-R.

Wis., Little Chute—May 20, by Village, constructing sanitary and storm sewers. P.W.A. project. A. E. McMahon Eng. Co., Neenah, engrs.

Wis., Milwaukee — May 28, by Sewerage Comn., constructing ferric chloride storage tanks and sludge conditioning tanks, incl. superstructure, $85,000. P.W.A. project. J. L. Ferebee, Milwaukee, ch. engr.

Wis., Neenah and Menasha — May 28, by Sewerage Comn., constructing intercepting sewers, Divisions B, C, D, E, F and H. P.W.A. project. Bids Dec. 5 and Jan. 10 rejected. Noted Jan. 20, C. D.—Jan. 23, E. N.-R.

Man., Winnipeg—June 3, by Chairman Greater Winnipeg Sanitary Dist., 223 James Ave., at Room 4, City Hall, supplying, erecting, installing, sewage regulators, sewage pumping units and combined sewage screening and cutting units and appurtenances.

CONTRACTS AWARDED

Calif., Stockton—City Council, 275 lin.ft. 12 in. vitr. clay pipe, 4,950 lin.ft. 24 in. vitr. clay pipe encased in cradle of concrete, 15 five ft. brick manholes, replace pavements, etc., to W. J. Tobin, 3701 Balfour Ave., Oakland, $27,675. Awarded Apr. 30. Noted May 1, C. D.—Apr. 30, E. N.-R.

Calif., Vallejo—A. Edgecumbe, city clk., constructing 40 lin.ft. 48 in. i.d. rein.-con. and 1,780 lin.ft. 12- to 33-in. vitr. clay pipe sewer, Schedule A, Virginia St., and 88 lin.ft. 30 in. i.d. rein.-con. pipe, 2,208 lin.ft. 12- to 36-in. vitr. sewer, Schedule B, Sonoma St., to R. B. Carlson, Weber Ave. and E St., Stockton, $13,666 and $15,598 respectively. Bids Apr. 24, awarded May 1. Noted May 1, C. D.—Apr. 30, E. N.-R.

★**Ill., Chicago** — Sanitary Dist., 910 South Michigan Ave., constructing Upper Des Plaines Intercepting Sewer, to S. A. Healy Co., 610 West Van Buren St., Chicago, $1,259,710. P.W.A. Bids Apr. 9, awarded May 7. Noted Mar. 31, C. D.—Apr. 9, E. N.-R.

Ill., Chicago—Sanitary District of Chicago, 910 South Michigan Ave., constructing Div. A, North Side Sewer Treatment Works, to Paschen Bros., 33 North LaSalle St., $369,195. P.W.A. Bids Apr. 23. Noted May 7, C. D.—Apr. 9, E. N.-R.

Ill., Waterloo—City laying sewers in various streets, to Thompson Constr. Co., Waterloo, $51,500 bonds authorized. Bids opened in December, Sheppard, Morgan & Schwaab, Faulstich Bldg., Alton, engr.

Ill., Wyanet—City, c/o R. R. Kermeen, pres. Village Bd. Trustees, contract awarded subject to outcome election to be held May 7, 5,376 ft. 10 in. and 14,294 ft. 8 in. sewer from .0 to 6 ft. to 16 to 18 ft. deep, 12,000 ft. 6 in. house connections, one special manhole and pump, 50 of 4 in. c.i. water pipe, 41 manholes, one 20 ft. service pipe crossing Main St., 1 cu.yd. rock excav., 1 cu.yd. concrete cradle, to J. Morman & Co., Oglesby, $32,874. P.W.A. Noted Jan. 9, C. D.—Jan. 16, E. N.-R.

Mass., Salem—See "Streets and Roads."

Minn., St. Paul—Minneapolis-St. Paul Sanitary Dist., M. Rosen, secy., University Ave., general contract 1 and 2 story (1st), 65x115 ft. and (2nd), 66x46 ft. administration building for joint Twin City sewage disposal plant, on Pig's Eye Island, to W. W. Magee, 118 West Central Ave., $125,829. P.W.A. Noted May 1, C. D.—May 7, E. N.-R.

N. Y., Baldwinsville—Village, constructing 2 disposal plants, complete trunk line system, incl. lateral sewers in various village streets, by relief labor. $303,374. W.P.A. Owner will pay $75,000 of total cost. W.P.A. funds tentatively allotted. Work to begin soon under owner's supervision. Noted Apr. 29, C. D.—May 7, E. N.-R.

N. Y., New York—F. P. S. Contg. Co., general contractors, 2883 Edington Ave., 300 tons reinforcing steel for sewer in DeReimer Ave., to Concrete Steel Co., 2 Park Ave., New York, for J. Lyons, pres. Bronx Boro, Bronx County Bldg. Noted Mar. 30, C. D.—Apr. 2, E. N.-R., under "Contracts Awarded."

N. Y., Port Dickinson—Village, constructing 36 in. sewers for drainage, by relief labor. $23,000. W.P.A. Materials will be purchased by W.P.A.

O., Wilmington—City, rein.-con. precast mono concrete sewer and V.P. laterals, Sect. 3, Sanitary and Storm Sewer System, to W. H. Crawford & Son, $95,316. Est. $117,000. P.W.A. Noted May 4, C. D.—May 7, E. N.-R.

R. I., Newport—City, J. A. Openshaw, comr. P. Wks., City Hall, constructing vitr. clay and concrete sewers in various streets, by day labor under W.P.A. Owner purchases materials. Est. about $168,000.

Tenn., Jackson—City Commissioner, constructing sewer extension, to Smith Pew Constr. Co., 786 West Peachtree St. N.W., Atlanta, Ga., $45,398. P.W.A. Noted Apr. 14, C. D.—Mar. 19, E. N.-R.

Wis., Racine—City, constructing North Side Interceptor, to M. Thomsen, 2703 73rd St., Kenosha, $294,659. P.W.A. Bids Apr. 2. Noted Apr. 7, C. D.—Apr. 9, E. N.-R.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., Los Angeles—State Hy. Comn., Sacramento, preparing plans in office of Los Angeles City Engineer, Van Nuys, for bridge over Tujunga Wash, Foothill Blvd., 2.5 mi. west of present structure (Foothill Blvd. to be rerouted). $104,000. L. Aldrich, city engr.

Conn., Andover—State Hy. Dpt., State Office Bldg., Hartford, plans concrete hy. bridge over railroad tracks and straightening hy. on U. S. Hy. 6-A, $75,000. J. A. Macdonald, State Office Bldg., Hartford, comr.

Iowa—State Hy. Comn., Ames, plans constructing 37 ft. through girder underpass structure on Primary Rd. 11, in Fayette at C. M. St. P. & P. R.R., incl. 135 cu.yd. Class 1 excav. F. R. White, Ames, state hy. engr.

Iowa—State Hy. Comn., Ames, withdrew bids to have been opened May 12, constructing bridges and culverts in Montgomery Co., F. R. White, state hy. engr. Noted May 4, C. D.—May 7, E. N.-R.

Iowa—State Hy. Comn., Ames, made plans constructing one 122x24 ft. continuous I-beam overhead bridge, on Primary Rd. 175, in Jewell, at C. & N. W. Ry. crossing, incl. 310 cu.yd. excav.; one 122x24 ft. continuous I-beam bridge, on secondary road, north of Hampton, C. R. I. & P. R.R. crossing, 255 cu.yd. excav., both Franklin Co., F. R. White, state hy. engr.

†*Federal Government*

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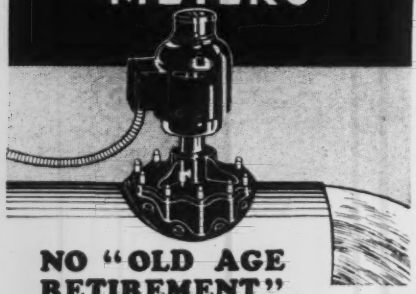

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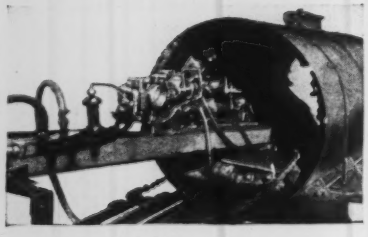

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Bridges, etc. (Continued)

Iowa—State Hy. Comn., Ames, soon takes bids constructing one 36x77 ft. I-beam bridge, 980 cu.yd. Class 1 and 430 cu.yd. Class 2 excav.; and one 210x20 ft. continuous I-beam bridge, 55 cu.yd. Class 1, 140 cu.yd. Class 2 and 1,250 cu.yd. channel excav., on secondary roads in Norway and Eagle Grove Twps., Wright Co. F. R. White, ch. engr.

Iowa—State Hy. Comn., Ames, soon takes bids constructing 7 pipe culverts and extensions, 3 rein.-con. pipe culverts and 8 rein.-con. box culverts and extensions, incl. 323 cu.yd. Class 1 excav.; and one 40x20 ft. I-beam bridge, 35 cu.yd. Class 1 excav., on secondary road, north of Cascade, Dubuque Co. F. R. White, Ames, ch. engr.

Ia., Cresco—Howard Co., G. L. Champlin, aud., plans constructing bridges and culverts, $10,525; 42 mi. grading, $23,320; 35.25 mi. graveling, $12,170, on secondary roads, for 1936. L. L. Lowry, co. engr.

Ia., Eldora—Hardin Co., F. Jackson, aud., plans constructing bridges and culverts, $30,546; 70.9 mi. grading, $39,456; 51.3 mi. graveling, $7,905, on secondary roads, for 1936 program. C. A. Boeke, co. engr.

Ia., Greenfield—Adair Co., D. D. Simpson, aud., plans bridges and culverts, $26,528; graveling 6.14 mi., $10,775; and grading 133,200 cu.yd., $18,648, on secondary roads. F. A. Malcolm, co. engr.

Ia., Independence—State Hy. Comn., Ames, plans constructing 190 ft. continuous I-beam span over Pine Creek, between Winthrop and Aurora. $25,000 federal appropriation. H. L. Lyon, co. engr.

Ia., Knoxville—Marion Co., G. Paardekooper, co. aud., plans constructing bridges and culverts $20,975; 68.5 mi. grading $49,725; 121.6 mi. graveling $55,300. R. T. Johnson, co. engr.

Ia., Oskaloosa—Mahaska Co., B. E. Evans, aud., plans constructing bridges and culverts $13,464; grading 32.2 mi. $55,490; graveling 32.2 mi. $37,838, on secondary roads during 1936 to 1938. R. H. Tumy, co. engr.

Ia., Primghar—O'Brien Co., I. R. Isenberg, aud., plans constructing bridges and culverts $40,687; grading 43.5 mi. $72,212; and 66 mi. graveling $52,824, on secondary road for 1936-37 road program. W. L. Anderson, co. engr.

Ia., Sac City—Sac Co., W. Gilbert, aud., plans constructing bridges and culverts $27,169; 61.5 mi. grading $21,610; 37 mi. graveling $22,434, on secondary roads. W. C. Otto, co. engr.

Maine—State Hy. Dpt., L. D. Barrows, ch. engr., Augusta, making plans grade crossing elimination, rein.-con. and structural steel construction, gravel or concrete approaches, Route 15, Sapling Twp. $75,000.

Maine—State Hy. Comn., Augusta, L. D. Barrows, ch. engr., plans rein.-con., structural steel bridge over Piscataqua River, Kittery, $120,000. **Maturity indefinite.**

Mass., Lee—Town, A. F. Viola, chn. Bd. Selectmen, Town Hall, making plans rein.-con. and structural steel bridge, P.W.A. Project 1238. $40,000.

Mass., Pepperell—Town, O. B. Olsen, chn. Bd. Selectmen, M. E. Chapman, chn. Building Comn., Town Hall, plans reconstructing single span steel, rein.-con. bridge over Nashua River, Main St., damaged by flood. Est. $25,000.

Mass., Spencer—Town, F. D. Cournoyer, chn. Bd. Selectmen, Town Hall, plans reconstructing Wire Village Bridge, rein.-con., structural steel, washed out by recent flood. $20,000 to $25,000.

Mass., Springfield—City, Dpt. Engineering & Streets, making plans and soon takes bids stone faced and rein.-con. bridge and underpass, State St. $45,000. H. G. White, 296 Bridge St., engr.

Mo., St. Louis—Bd. P. Serv., City Hall, rejected bids Apr. 24, constructing timber deck on railroad deck of municipal bridge across Mississippi River and approaches incl. replacing ties, rails and guard rails and placing new ties and timbers on new approaches. $200,000. Will readvertise. C. E. Smith & Co., Railway Exch. Bldg., engrs. Noted Apr. 29, C. D.—May 7, E. N.-R.

Nebraska—State, Lincoln, plans constructing viaduct over Union Pacific R.R. tracks. $100,000. A. C. Tilley, Lincoln, state engr.

Neb., Hastings—Hastings City Officials and Council approved the contract with State Hy. Dpt. and Union Pacific R.R. Co. for constructing viaduct over U. P. railroad tracks here. $102,000.

New Hampshire—State Hy. Dpt., F. E. Everett, comr., Patriot Bldg., Concord, plans rebuilding 40 ft. span steel bridge with concrete abutments, destroyed by recent flood, East Jaffrey Rd., Peterboro. $30,000. A. H. White, Bennett Blk., Keene, engr.

New York—Dpt. P. Wks., Albany, made plans and soon takes bids constructing several bridges and culverts on Wawbeck-Saranac Lake Point Rd. To exceed $23,000. T. F. Farrell, Albany, state hy. engr.

N. Y., Schuylerville—State Dpt. P. Wks, State Office Bldg., Albany, made plans constructing concrete, steel grade crossing elimination over Delaware & Hudson R. R. tracks, on Schuylerville-Greenwich Rd. $82,890.

N. Y., White Plains—Bd. Supervs., Westchester Co., plan constructing viaduct at Fleetwood between Yonkers and Mount Vernon, to carry Cross County Parkway across Bronx River Parkway adjacent to railroad tracks, not to exceed $100,000; constructing underpass of Post Blvd. and Hutchinson River Parkway in New Rochelle, to exceed $100,000; have applied for $4,000 appropriation for making necessary

Pa., Mount Pocono—Delaware, Lackawanna & Western R.R. Co., G. A. Phillips, engr., Hoboken, N. J., soon takes bids eliminating grade crossing at Mt. Pocono R.R. station on State Hy. Route 168, moving railroad right-of-way 500 ft. to west and relocating road from Paradise Twp. to here, providing underpass carrying 44 ft. roadway and 7 ft. sidewalk under tracks of railroad company. Est. $325,840. Project approved by Public Service Comn. State Hy. Dpt. will soon take bids for construction work. Noted Aug. 19, C.D.—Apr. 23, E.N.-R.

Tex., San Antonio—State Hy. Dpt., Southern Pacific R.R., W. H. Kirkbride, ch. engr., San Francisco, Calif., and Missouri, Kansas & Texas R.R., F. Ringer, ch. engr., Dallas, and certain maintenance obligations by city, bids early in June, constructing 160 ft. underpass under Nogalitos St. crossing of railroads. Est. $175,000. State Engineering Branch also assistance from 2 Railroad Engineering Dpts., engrs. Bids in June for same.

Ont., Thamesville—Dpt. Hys., Parliament Bldgs., Toronto, soon takes bids 60 ft. continuous steel bridge over Thames River, Hy. 2. $75,000.

P. E. I., Charlottetown—Provincial Govt. Dpt. P. Wks., making plans constructing permanent bridges $35,000, steel culverts $15,000 and Rustico Hy. $96,000.

BIDS ASKED

Ia., Charles City—May 19, by Floyd and Mitchell Counties, at Charles City, G. O. Mitchell, aud., constructing 350 ft. continuous deck plate girder bridge over Red Cedar River, Sect. 24, T97N, R16W, Floyd and Mitchell Counties.

Ia., Primghar—May 19, by O'Brien Co., I. R. Isenberg, aud., 24 concrete box culverts and extensions; three I-beam bridges with concrete floor and treated wood substructures. W. L. Anderson, co. engr.

Kansas—See "Streets and Roads."

Louisiana—May 20, by State Hy. Comn., Baton Rouge, overpass and approaches 0.644 mi. De Quincy-De Ridder Hy., Route 104, Project 1553, WPGS 338, Beauregard Parish; overpass and approaches 0.566 mi. Shreveport-Many Hy., Route 1, Project 1858, WPGH 68-B, Caddo Parish.

Maine—May 20, by State Hy. Comn., L. D. Barrows, ch. engr., Augusta, Cedar Brook Bridge, P.W.A. 1014-35, Grafton Plantation, involving 218 cu.yd. rein.-con.; Meadow Brook Bridge, P.W.A. 1014-34, Howland, 375 cu.yd. rein.-con.; Dickey Brook Bridge, P.W.A. 1014-23, Twp. 17, 37,500 lb. structural steel, 1,800 lin.ft. wood piles, 18,000 ft. B.M. round timber, 15,000 B.M. square timber. Total est. exceeds $23,000.

Massachusetts—See "Streets and Roads."

New Jersey—May 25, by E. D. Sterner, comr., State Hy. Dpt., Trenton, constructing grade crossing elimination, Route S-40, Central R.R. N. J. Woodland Twp., Burlington Co., incl. 41,456 roadway and 309 cu.yd. foundation excav.

★ **New York**—May 26, by A. W. Brandt, comr. Hys., Albany, constructing two 195 ft. span bridge on Chenango Forks-North Fenton Rd., SH 1241 ER11-B, and approaches on Barker Rd., SH 375, Broome Co., $118,242***3 concrete beam spans, 104 ft. long for grade crossing elimination structure on Cortland-Homer Rd., SH 208, WPGH 233, and 40 ft. span on Homer Village, SH 5058, Cortland Co., $142,546 ***three span 54 ft. bridge carrying New York Central and Delaware, Lackawanna & Western R.R. on Syracuse-City-South Geddes St., WPGM 980-A, Onondaga Co., $416,236; 76 ft. girder with two 20 ft. and one 23 ft. concrete beam approach spans over New York Central R.R. on Brewster-Carmel Rd., SH 909, WPGM 590-B, Putnam Co., $64,725***four 50 ft. girder bridge over Delaware & Hudson R.R. on Schuylerville-Greenwich Rd., SH 1437, WPGH 504-G, Washington Co., $82,890. Total $824,639.

New York—May 29, by Transit Comn., 270 Madison Ave., New York, reconstructing bridges carrying Walton Ave. over the tracks of Hudson-Electric Div. of New York Central R.R.; carrying East 170th St. over tracks of Harlem-Electric Div., New York Central R.R.; carrying East 173rd St. over tracks of Harlem-Electric Div., New York Central R.R.; carrying East 183rd St. over tracks of Harlem-Electric Div., carrying East 200th St. over tracks of Harlem-Electric Div., with related structures.

N. Y., Albany—See "Contracts Awarded."

Oregon—See "Streets and Roads."

South Carolina—May 19, by State Hy. Dpt., Columbia, constructing 96 ft. combination underpass and approaches under Southern R.R., Route 9, W.P.G.S. 399, Union Co., incl. 13,800 cu.yd. excav. and earth type surfacing, $23,000; 224.7 ft. rein.-con. and structural steel bridge over A. C. L. R.R. and concrete approaches at North Charleston, Route 52, W.P.G.H. 22, Charleston Co., 30,400 cu.yd. excav., $82,900; 190 ft. bridge over G. and F. R.R., concrete paving 0.02 mi. approaches, Route 25, W.P.G.H. 21, Edgefield Co., $13,600; double 10x10x35 ft. rein.-con. culvert over Goodman's Creek and 150 ft. rein.-con. bridge over Westfield Creek,

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†*Federal Government*

Bridges, etc. (Continued)

between Cheraw, S. C., and Wadesboro, N. C., U. S. Route 52, W.P.G.H. 343, Chesterfield Co., $15,800; 90 ft. rein.-con. bridge over R. U. C. R.R., Route 176, W.P.G.M. 403, Union Co., $14,300.

Tex., San Antonio—State, City, Bexar Co. and Southern Pacific Ry., c/o Engineering Branch, W. H. Kirkbride, San Francisco, Calif., ch. engr., bids about May 15, constructing 240 ft. underpass on Frio City Rd. under Southern Pacific Ry. tracks, St. Mary St. $200,000. I. Ewig, city engr. W. S. Goodman Co., c/o Court House, co. engr.

Alta., Calgary—May 21, by E. D. Cotterell, genl. supt. Canadian Pacific Ry., Calgary Station, supplying and constructing 4 Howe truss spans across Red Deer River at East Coulee.

CONTRACTS AWARDED

Alabama—See "Streets and Roads."

Arizona—State Hy. Dpt., Phoenix, removing existing bridge and constructing new concrete, steel bridge over White Creek Bridge, and removing temporary wooden detour bridge, Cochise Co., to Vinson & Pringle, 919 Madison St., Phoenix, 1.4 mi. west of Douglas, **$38,839.** Est. $107,000. Noted Apr. 17, C.D.

Connecticut—See "Streets and Roads."

Iowa—State Hy. Comn., Ames, 1 corrugated metal pipe culvert extension, 12 rein.-con. pipe culverts and 22 rein.-con. box culverts in Fayette Co., to Christensen Bros., Sioux City, **$14,120**•••three 32x24 ft. I-beam span bridge on same road, to T. Fisko, Garber, **$11,524**•••5 rein.-con. pipe and 5 rein.-con. box culverts in Fayette Co., to F. A. Moser, Strawberry Point, **$3,561**•••one 50x24 ft. rein.-con. arch bridge in Hamilton Co., to Zitteral-Mills Co., Webster City, **$13,210**•••one 150x24 ft. high truss bridge with seven 37x24 ft. I-beam approach spans in Mahaska Co., to B. Cole & Son, Ames, **$48,822**•••moving and re-erecting one 150x18 ft. high truss span with fifteen 20x18 ft. I-beam approach spans and constructing 1 rein.-con. box culvert in Mahaska Co., to A. Olson Constr. Co., Waterloo, **$29,196**•••one 50x24 ft. I-beam bridge and one 122x24 ft. continuous I-beam bridge in Wapello Co., to Layton & Plumb, Muscatine, **$9,893** and **$27,678** respectively••• two 40x24 ft. I-beam span bridge in Wapello Co., to Ottumwa Bridge & Constr. Co., Ottumwa, **$17,014.** Grand total $175,018. Bids Apr. 28, awarded Apr. 28. Noted May 4, C.D.—Apr. 23, E.N.-R.

Kansas—See "Streets and Roads."

Kansas—State Hy. Comn., Anthony, to Banta Constr. Co., Harper, constructing Br. 0.2, two 8x7x45-3 ft. rein.-con. spans, WPMS 551D, **$3,194**; Br. 2.2, two 10x10x51 ft. rein.-con. spans, WPSO 551D, **$4,657**; Br. 4.7, two 14x12x32 ft. rein.-con. spans, WPSO 551D, **$5,729,** all foregoing Harper Co.•••to H. J. Taylor Constr. Co., Salina, constructing Br. 8.5, viaduct, P. 50S-12-WPGM 302H, Edwards Co., **$61,725**•••to W. B. Honska Constr. Co., Salina, Br. 8.7, 22x40 ft. rein.-con. deck girder, WPSO 551D, Harper Co., **$84,810.** Grand total $160,115. Bids Apr. 30. Received no bids Apr. 30, 9x30 ft. rein.-con. deck girder, Br. 0.8, WPSO 551D, Harper Co. Noted Apr. 14, C.D.—Apr. 16, E.N.-R.

Kan., Mullinville—Matthews & Kenan, engrs., Smith Young Tower, constructing 350 ft. trestle bridge across Rattlesnake Creek, near here, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, Ia., about **$170,000.**

Maine—State Hy. Comn., L. D. Barrows, ch. engr., Augusta, constructing Lamson Bridge, P.W.A. 1004-32, over Lamson Stream, Addison, and Cross Cove Bridge, P.W.A. 1014-11, Jonesport, to H. L. Goodrich, Palmyra, **$11,066** and **$28,695** respectively•••McShea Crossing over Bangor & Aroostook R.R., Fort Fairfield, Projects 90 B and C, to Wyman & Simpson, Inc., 284 Water St., Augusta, **$45,696**•••Phair Crossing Bridge over Bangor & Aroostook R.R., Prisque Isle, Project 52, to R. Giovannucci, Pittsfield, **$46,065.** Grand total $131,522. Bids Apr. 22, awarded May 1 and 5. Noted Apr. 29, C.D.—Apr. 16, E.N.-R.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, grade crossing, Project WPGH 137-D, steel stringer bridge with bituminous macadam approaches over New York, New Haven & Hartford R.R. at Ashley St., Sheffield, to B. A. Gardetto, 79 Milk St., Boston, **$106,843.** Bids Apr. 29, awarded May 6. Noted May 6, C.D.

Missouri—State Hy. Dpt., Jefferson City, bridge under Missouri Pacific R.R. and retaining wall on Ivory Ave., in St. Louis, to C. H. Atkinson Paving Co., Chillicothe, and to Condon, Cunningham & Lemmon, Kirkwood•••bridge over Robinson Branch and over Dry Fork, Moniteau Co., to Davis Constr. Co., Boonville••• bridges over Barnell Lake, Mississippi Co., over old channel Little River, over Drainage Ditch 5, over Drainage Ditch 53, over Drainage Ditch 52, all foregoing in New Madrid Co., to H. R. Fisher, Poplar Bluffs•••bridges over branch and over Bear Branch, Iron Co., to Firman T. O'Dell, Hannibal•••over West Tarkio Creek, Atchison Co., to F. M. Clark & Son, Savannah•••over St. Francois River, Madison Co., to J. R. Hancock, St. Louis•••over Blue River and railroad tracks, Jackson Co., to Wisconsin Bridge & Iron Co., 5023 North 35th St., Milwaukee, Wis.•••over Four Mile Creek, Dallas Co., to C. I. Williams, Monett•••over Fourche Creek, Ripley Co., to Service Constr. Co., Poplar Bluffs•••over west fork of Lost Creek, DeKalb Co., to Vaughn Constr. Co., Kirksville•••over Whitewater River, Bollinger Co., to Kelly & Underwood, Granby. Noted Apr. 16, C.D.—Apr. 2, E.N.-R.

★ **Mo., Kansas City** — City and State Hy. Comn., Jefferson City, constructing 11 span 2,000 ft. steel truss viaduct with concrete floor (4 lanes) two sidewalks, concrete handrails over Blue River on 23rd St., Kansas City, Jackson, to Wisconsin Bridge & Iron Co., 53 West Jackson Blvd., Chicago, Ill., **$535,703.** Est. $1,500,000. Noted Mar. 18, C.D., under "Missouri."

New York — A. W. Brandt, comr. Hys., Albany, constructing bridge in Broome Co., to Sarafine Constr. Co., Inc., 10 Fayette St., Binghamton, **$45,182** est. $55,067•••culverts and bridges in Schuyler Co., to Seneca Eng. Co., Montour Falls, **$63,358** est. $79,902. Bids Mar. 17. Withdrew bids Mar. 17, bridge in Schuyler and Tompkins Counties. Noted Mar. 20, C.D.—Mar. 12, E.N.-R., under "Streets and Roads."

New York—Wilson & English Constr. Co., general contractors, 50 Church St., New York, 100 tons reinforcing steel for improving Laurelton Parkway, Queens Boro, for Dpt. P. Wks., Albany, to Concrete Steel Co., 2 Park Ave., New York. Noted Apr. 10, C.D.—Apr. 16, E.N.-R., under "Contracts Awarded."

New York—Dpt. P. Wks., Albany, constructing box culvert on Davenport Center-Oneonta Rd., Delaware Co., to Mid-State Builders, Inc., Utica, **$32,471** est. $68,622•••24 ft. slab bridge on Bridge Rd. Hy. 268, Broome Co., to H. J. Stimm, Inc., Ellicott Sq., Buffalo, **$29,915** est. $39,065•••bridges on 2.15 mi. Campbell-Bath Hy. 5224 and Bath-Savona Hy. 754, Steuben Co., to Maple City Lumber & Supply Co., Inc., Hornell, **$119,243** est. $153,753. Grand total $201,629. Bids Apr. 28. Bids constructing bridge on Henry Hudson Parkway, Bronx Co., held up. Bids for bridges on Cortland-Homer Hy. 208 and Homer Village Hy. 5058, Cortland Co., and Culverts 26, 40, 47, 48-A and Bridges 27, 60, 107, 108 and 109, Steuben Co., withdrawn. Noted Apr. 9, C.D.—Apr. 16, E.N.-R.

N. Y., Albany—Delaware & Hudson R.R. Corp., J. MacMartin, ch. engr., Albany, relocating double track main near Howe's Cave, following extensive slides in vicinity, own forces, $80,000. H. S. Clarke, Delaware and Hudson Bldg., Albany, engr.

N. Y., Albany—Bd. Supervs. Albany Co., constructing rein.-con. bridge over Vaulm Kill, on Bethlehem Center-Feura Bush Hy., own forces. To exceed $23,000. Owner will purchase materials.

N. Y., Albany—See "Streets and Roads."

N. Y., Schenectady—See "Streets and Roads."

North Carolina—State Hy. Comn., Raleigh, W. V. Baise, engr., overhead crossing in Calypso, Project 2180, Duplin Co., to Bowers Constr. Co., Whiteville, **$24,460.** Bids Apr. 15, awarded May 5. Noted Apr. 23, C.D., under "Streets and Roads."

N. C., Matthews—Seaboard Air Line R.R., W. D. Faucette, ch. engr., Norfolk, Va., constructing railway trestle at Matthews, to G. Palmer, Florence, S. C. Private plans.

North Dakota and Minnesota — State Hy. Comrs., North Dakota and Minnesota, at Court House, Fargo, N. D., constructing 770 ft. interstate bridge and 353 ft. approaches over Red River of the North between 1st Ave. S., Moorhead, Minn., and Front St., Fargo, N. D., to Rue Constr. Co., 111 3rd St., Fargo, N. D., and Megarry Bros., Bismarck, N. D., **$263,938.** Noted Apr. 30, C.D.—May 7, E.N.-R.

Ohio—See "Streets and Roads."

Pa., Lock Haven—See "Streets and Roads."

Pa., Sharon—Comrs. Mercer Co., constructing Bridge 2302, 185 ft. main span, two 35 ft. approach spans over Pine Run, at South Oakland Ave., to Freeland Co., Inc., 1 Penn Ave., Pittsburgh, **$136,000.** Est. $160,000. Bids Mar. 9. Noted Mar. 16, C.D.—Mar. 5, E.N.-R.

South Dakota—See "Streets and Roads."

Tennessee — State Hy. Dpt., Nashville, construction of and paving overhead and approaches over N. C. and St. L. R.R. on State Hy. 1, Carroll Co., to T. M. Strider, Cotton States Bldg., Nashville, **$51,187;** constructing overhead and approaches over Tennessee Central Ry. on State Hy. 24, Cookeville, Putnam Co., to Marion Constr. Co., Nashville, **$40,460.** Bids Apr. 17. Noted Apr. 2, C.D.—Apr. 30, E.N.-R., under "Streets and Roads."

Wisconsin—See "Streets and Roads."

STREETS AND ROADS

BIDS ASKED

Calif., Hanford—Supervs. Kings Co., taking bids grading for shoulder work and headerboards, 21,120 lin.ft., 3,016 tons asphaltic concrete base material in shoulders and leveling course, 4,984 tons asphaltic concrete top, J. R. Hayes, Hanford, engr.

Conn., Hartford—May 19, by Bd. Contr. & Supply, sheet asphalt surfacing in patching and repairing streets 24,640 sq.yd. streets, $50,000. R. N. Clark, city engr.

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†*Federal Government*

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FULL ¾ YD. CAPACITY
4 TON CRANE LOAD
WEIGHS ONLY 10 TONS

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- Helical cut gears—noiseless, long wearing
- Unit car body and machinery table, totally heat treated.
- Frictionless bearings thruout.
- 6 cylinder power.
- Drop forged crawler shoes.
- Chain crowd with automatic adjustment.
- Fast operating speeds.
- Safety worm boom hoist.
- Separate hoist drums.
- Full cab enclosing ALL machinery.

TYPES AND SIZES

Capacity	Model
⅜ yd.	20
⅜ yd. (Truck Shovel)	10
⅜ yd. (Tractor Shovel)	¾ Circle
½ yd.	30
⅝ yd.	38
¾ yd.	45
⅞ yd.	52
1 yd.	62
1¼ yd.	65

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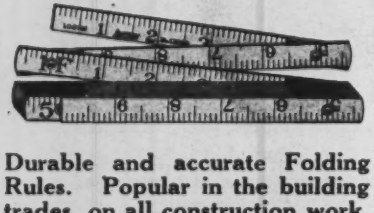

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Streets and Roads (Continued)

Ill., Chicago—May 19, by Dpt. P. Wks. & Buildings, Div. Hys., concrete paving 1.1 mi. Sect. 054-3632; 1 mi. Sect. 054-3232; 1.5 mi. Sect. 046-1819; 0.6 mi. Sect. 128-1819; bituminous surfacing 3 mi. Sect. 005-0103; 4 mi. Sect. 203-0508; 0.5 mi. Sect. 001-0404. G. H. Baker, engr. county roads and city streets. P.W.A. project.

Ill., Chicago—May 19, by Cook Co., G. A. Quinlan, supt. Hys., 221 North LaSalle St., improving paving projects 3-A, 3-B, 14-B, 22, 51, 66-C and 71. P.W.A. project.

Ill., Rock Island—May 19, by Dpt. P. Wks. & Buildings, Div. Hys., grading, concrete paving culverts 2.7321 mi. Sect. 42-MFT. G. H. Baker, engr. county roads and city streets.

Ill., Waukegan—May 20, by Lake County Bridge & Road Comn., c/o R. M. Lobdell, supt. Hys., Court House, concrete paving 1.2312 mi. Sect. 58-15D, S.A.R. 23 extension, Dygdale Rd.

Iowa—State Hy. Comn., Ames, withdrew bids to have been opened May 12, grading 6.068 mi. roads in Montgomery Co. F. R. White, ch. engr. Noted May 4. C. D.—May 7. E. N.-R.

Iowa—State Hy. Comn., Ames, rejected bids Apr. 28, bituminous surfacing roads in Adams, Allamakee, Fremont and Taylor Counties. Noted May 4. C. D.—Apr. 23. E. N.-R.

Ia., Garner—May 19, by Hancock Co., F. C. Missal, aud., grading 30 mi. local county road, incl. 200,000 cu.yd. casting excav. C. F. Merten, co. engr.

Ia., Leon—May 19, by Decatur Co., W. B. Halstead, aud., grading 8.5 mi. County Trunk Rd., incl. 108,000 cu.yd. earth excav. and 50 cu.yd. loose rock excav. I. L. Sharp, co. engr.

Ia., Spencer—Clay Co., M. M. Moulton, aud., grading 20.25 mi. roads, incl. 200,000 cu.yd. casting excav., 2,300 lin.ft. roadway culvert pipe and 2,400 lin.ft. entrance culvert pipe. F. Campbell, co. engr.

Kansas—May 22, by State Hy. Comn., at office of County Clerk, Leavenworth, limestone for cover material surfacing, keystone for cover material surfacing, sand, gravel or limestone for cover material surfacing, chat or limestone for cover material surfacing, Keystone for cover material surfacing, earthwork, bridging, 196.2 mi. hys. in Shawnee, Osage, Marshall, Nemaha, Lyon, Jackson, Doniphan, Brown, Atchison, and Leavenworth Counties.

Kentucky—May 29, by State Hy. Comn., Frankfort, high type surfacing 0.683 mi. Main St., Scottsville, WPMH 204-B-S, Allen Co.; 0.762 mi. Paintsville-Pretonsburg Rd., WPMH 133 D-S, Johnson Co.; 0.659 mi. South Broadway in Lexington, WPMH 369-A-S, Fayette Co.; grading, draining 3.8 mi. Jackson-Booneville Rd., WPSO 442 A, G. Owsley Co.; roadside improvement Richmond-Lexington Rd., NRH 124 A-P1, Madison Co.

Louisiana—May 20, by State Hy. Comn., Baton Rouge. **(P. means Project)**, grading, structures 6.288 mi. Lake Providence-Arkansas State Line Hy., Route 3, P. 2751-A, NRH-47, East Carroll Paris; 1.794 mi. Intersection Route 1-Intersection Route 14 Hy., Route 615, P. 4954-A-1, WPMS 305-A, Rapides Parish; concrete paving 2.463 mi. Gibson-Donner Hy. Route 28, P. 6450-A, WPSS 297, Terrebonne Parish; 0.344 mi. hy. in Gretna, Route 451, P. 3652, Jefferson Parish; 3.965 mi. Algiers-Cut Off, Route C-1373, P. 4555, WPMS 302, Orleans Parish; 6.519 mi. Hosston-Gilliam Hy., Route 55, P. 1853, F. A. P. 45, reopened and 313, Caddo Parish; surface treating 3.63 mi. Baton Rouge-Comite Hy., Route 37, East Baton Rouge Parish, P. 2656, WPSS 332; grading, surfacing 5.14 mi. Fairloth-New Verda Hy., Route 475, P. 891-C, WPSO 351, Grant Parish.

†Me., Cape Elizabeth—May 20, by P. Wks. Officer, Bldg. 39, Boston, Mass., repairing and altering Naval Direction Finder Station, incl. granolithic walks, cesspools, curbing, underground electric cables, and pump house.

Maryland—May 19, by State Roads Comn., concrete paving 1.74 mi. Contr. A-185-636, Alleghany Co.; 4.41 mi. Contr. Ch-162-1-811, Charles Co.; slate base paving 2 mi. Contr. H-199-1-45, Harford Co.

Md., Baltimore—May 20, by Bd. Awards, concrete paving 11,450 sq. yd. Paving Contr. 666.

Massachusetts—May 19, by Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, comr., 100 Nashua St., Boston, rein.-con. surfacing 6,305 sq.yd., bituminous macadam or penolithic type surfacing 9,915 sq.yd. Class I bitulithic concrete paving, grading, etc. 2,560 sq.yd., Contr. No. 5 of P.W.A. Project NRM 170-C, traffic circle and approaches at New Fore River Bridge, between Quincy and Weymouth. To exceed $50,000.

Massachusetts—May 21, by Commonwealth of Massachusetts, Metropolitan Dist. Comn. Water Supply Div., R. N. Molt, secy., F. E. Winsor, ch. engr., 20 Somerset St., Boston, bituminous macadam surface course paving 4.2 mi. hy. Petersham. To exceed $150,000.

Mass., Arlington—See "Contracts Awarded."

†Mass., Hingham—See "Contracts Awarded."

Mass., Medford—See "Contracts Awarded."

Mass., Milford—See "Contracts Awarded."

Mass., Salem—See "Contracts Awarded."

Mass., Taunton—See "Contracts Awarded."

Mass., Whitman—See "Contracts Awarded."

Minnesota—May 22, by State Hy. Dept., St. Paul, paving, grading 4.1 mi, road between Spring Valley and 3 mi. east, State Proj. 63-59-25-2A and 3, Federal Aid Project B2, C, and S.P. 16-9-39C, F.A.P. 352-A, 54,458 cu.yd. excav.

★ **Mississippi**—May 19, by E. D. Kenna, State Hy. Comn., Jackson, concrete [illegible] 13.614 mi. Groups A-12 or C-2, pavement [illegible] Olive- Mendenhall Hy., Simpson and [illegible] Counties, P.W.S. Docket 1043, R-16, 165 and 200-I, involving 26,447 cu.yd. [illegible] excav., $260,000; alternate Groups A [illegible] pavement 4.085 mi. Grenada-Memphis, P.W.S. 1043-R-45, Part 1, Yalabusha Co., [illegible] cu.yd. common excav., $80,000; 12.78[illegible] Tupelo-Corinth Hy., P.W.S. Docket 1043-215-B and 215-C, Prentiss and Alcorn Co. [illegible] 159,072 cu.yd. excav., $310,000; 14.10[illegible] Pickens-Durant Hy., P.W.S. Docket 1043-R and D, Holmes Co., 16,076 cu.yd. com[illegible] excav., $280,000; 7.73 mi. Canton-Pickens, P.W.S. Docket 1043-R-72-C, Madison Co. [illegible] cu.yd. common excav., $155,000; 14.14[illegible] Brooklyn-Hattiesburg Hy., P.W.S. Docket [illegible] C, Forrest Co., 25,876 cu.yd. common ex[illegible] $280,000; 9.335 mi. Jackson-Hazelhurst, P.W.S. Docket 1043-R-82-C and 82-G, Hinds and Copiah Counties, 39,899 cu.yd. common ex[illegible] $180,000; 10.505 mi. Tunica-Memphis, P.W.S. Docket 1043-R-190-C, and 190-D, Tu[illegible] Co., 11,095 cu.yd. common excav., $200,000; 5.554 mi. Leland-Cleveland Hy., P.W.S. Docket 1043-R-229-A, 18,464 cu.yd. excav., Bo[illegible] Co., $110,000. P.W.A. project.

New York—May 26, by A. W. Brandt, comr. Hys., Albany, graveling 6.25 mi. Hawthorne-Hill Rd., WPSO 974-A, Herkimer Co., $90,405; 6.57 mi. Starkville-Hesaville Rd. and Salt Springville Rd., WPSO 975-A, Montgomery Co., $70,055; concrete paving 0.18 mi. Solvay-State [illegible] Syracuse Rd., SH 1353, Onondaga Co., $28,441. Total $197,984.

N. Y., Albany—May 18, by City, City Hall, sidewalks on 6,000 lin.ft. each side of Central Ave. from Colvin Ave. to west city line. To exceed $23,000. J. McManus, city engr.

N. Y., Albany—See "Contracts Awarded."

N. Y., Champlain—See "Contracts Awarded."

N. Y., Ellenburg—See "Contracts Awarded."

N. Y., Little Valley—See "Contracts Awarded."

N. Y., Minden—See "Contracts Awarded."

N. Y., Niskayuna—See "Contracts Awarded."

N. Y., Rochester—See "Contracts Awarded."

N. Y., Saranac—See "Contracts Awarded."

N. Y., Saugerties—See "Contracts Awarded."

N. Y., Schenectady—See "Contracts Awarded."

N. Y., Van Buren—See "Contracts Awarded."

N. Y., Wampsville—See "Contracts Awarded."

North Dakota—May 22, by State Hy. Comn., Bismarck, graveling, structures on 15.606 mi. Karlsruhe northeast, southeast of Towner and southwest of Berwick, WPSO 498, WPSO 501, WPSO 502, McHenry Co., Incl. 23,905 cu.yd. unclassified excav.; grading, structures 5.249 mi. west of Shields, WPSO, 531, Grant Co., 90,182 cu.yd. earth excav.; 8.805 mi. Cando to Maza, WPGM 130, WPGH 130, Towner Co., 226,226 cu.yd. unclassified excav.; 7.918 mi. Medina West, WPH 306C, WPH 306E, in Stutsman Co., 134,072 cu.yd. earth excav.; 4.978 mi. Dawson East, WPH 306B, Unit 1, Kidder Co., 74,709 cu.yd. unclassified excav.; 9.7 mi. Dawson East, WPMH 306B, WPH 54, WPH 306, Unit 2, Kidder Co., 137,649 cu.yd. excav.; 5.569 mi. east of Bismarck, WPMH 174A, Burleigh Co., 114,469 cu.yd. unclassified excav.; 5.975 mi. Petersburg East, WPH 146, Unit 1, WPMH [illegible], Unit 2, WPH 349A, Nelson Co., 88,233 cu.yd. excav.; 12.281 mi. Amidon East, WPH 220C, WPMH 220D, Slope Co., 146,444 cu.yd. excav.; 5.13[illegible] Mi. Carrington North, WPGH 2A, Foster Co., 123,658 cu.yd. unclassified excav.; 4.211 mi. south of Fergus, NRS 559, Grand Forks Co., 63,970 cu.yd. unclassified excav.; 10.414 mi. east of Rangeley, WPSO 497, McHenry Co., 4.003 mi. north of Carrington, WPGH 92, Foster Co., 89,534 cu.yd. unclassified excav. W. J. Flannigan, state hy. comr.

Oregon—May 22, by State Hy. Comn., Portland, surfacing 11.5 mi. Criterion-Cow Canyon Sect. Dalles California Hy.; crushed rock surfacing 6 mi. Throemile Creek Eighmile Creek Sect. Dalles Dufur Co. Rd.; grading 3.15 mi. pit run and screened gravel surfacing 4.36 mi. Tygh Valley Sect. Sherars Bridge Secondary Hy., all foregoing Wasco Co.; crushed rock surfacing 3.46 mi. Columbia Co. Oiling Project four sections of county road, Columbia Co.; pavement planing, resurfacing 16.01 mi. Azalea Wolf Creek Summit Sect. Pacific Hy., Douglas and Josephine Counties; pit run gravel surfacing 10.48 mi. Cinder Butte Silver Creek Sect. Lakeview Burns Hy. and Silver Creek Sage Hen Hill Sect. Central Oregon Hy., Harney Co.; surfacing 5.3 mi. Wocus Marsh-Link River Sect. Klamath Lake Secondary Hy., Klamath Co.; grading 0.67 mi. roadbed topping Unit No. 1, 1.25 mi. Chichester Gulch Summit Section Shaniko Fossil Secondary Hy., and grading 0.58 mi. Unit 2, same road, Wheeler Co.; constructing 107 ft. composite pile trestle over Oregon Electric Ry. tracks, grading, surfacing 0.6 mi. Garden Home Sect., Garden Home County Rd. 1323, Washington Co.; constructing 32x120 ft.

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†Federal Government

Streets and Roads (Continued)

frame maintenance building, on State Hy. Comn. property in Astoria, Clatsop Co.; moving, re-establishing service station buildings, removal and constructing 450 sq.yd. concrete pavement on General Petroleum Co. property at southeast corner of intersection Pacific Hy. and Main St., Oregon City, Clackamas Co.

Pa., **Lock Haven**—See "Contracts Awarded."

★ **South Carolina**—May 19, by State Hy. Dpt., Columbia, grading 5.063 mi. Route 63, W.P.S.S. 368-B, Hampton Co., involving 41,000 cu.yd. excav., $30,500; 2.665 mi. Route 29, W.P.M.H. 428, Greenville Co., 241,500 cu.yd. excav., $133,300; 3.865 mi. Route 52, W.P.G.H. 43, Chesterfield Co., 131,000 cu.yd. excav. and surfacing, $67,500; grading and constructing 100 ft. combined combination bridge over Spears Creek, on County Rd., W.P.S.O. 415, Kershaw Co., 128,000 cu.yd. excav., $70,600; earth type surfacing 3.203 mi. Route 90, W.P.M.S. 418, Horry Co., 26,000 cu.yd. excav. and surfacing, $22,300; 0.492 mi. county road, W.P.G.S. 444, York Co., 5,000 cu.yd. excav. and surfacing, $3,700; 10.875 mi. Route 215, W.P.M.S. 408 and W.P.S.S. 408, Aiken Co., 94,000 cu.yd. excav. and surfacing, $67,700; concrete widening 0.358 mi. Route 76, N.R.M. 45-E, Richland Co., 1,800 cu.yd. excav., $25,000; bituminous surfacing 8.689 mi. Route 4, F.A.P. 361-B, Orangeburg Co., $31,000; concrete paving 2.413 mi. Routes 52, 78 and 2, N.R.H. 22 and 178, Charleston Co., 5,000 cu. yd. excav., $144,200; bituminous retreatment 20.234 mi. Route 34, State Projects 91 and 67, Contr. 2, Kershaw and Lee Counties, $15,000; 11.236 mi. Route 15, State Project 273, Contr. 2, Clarendon Co., $9,700; 7.463 mi. Route 391, State Project 793, Contr. 3, Newberry Co., $6,900; 13.723 mi. Route 6, State Project 589 C D and E, Contr. 3, Orangeburg and Bamberg Counties, $11,900; asphalt resurfacing 0.468 mi. and constructing bridge, U. S. Route 21, in town of Eau Claire, and constructing rein.-con. foot bridge over Smith's Branch and asphalt resurfacing and widening with concrete curbing and guttering 0.1 mi. U. S. Route 76, Columbia, N.R.M. 156, Sect. 1, Contr. 1, N.R.M. 156, Sect. 3, Contr. 2, and 339-C, Richland Co., 300 cu.yd. excav., $7,100; sheet asphalt resurfacing 0.7 mi. and concrete paving 1.016 mi. section U. S. Routes 25 and 178, N.R.M. 55-A and N.R.H. 55-A, Sects. 1, 2, 3, 4 and 5, Greenwood Co., 11,300 cu.yd. excav., $66,000.

Tennessee—May 22, by State Hy. Dpt., Nashville, widening and paving 4.819 mi. Hy. 33, WPMH 297-B, Parts 1 and 2, and Part 2 extended, Knox Co.; grading, drainage 6.706 mi. Non-System H., WPSO 427-A, Parts 1 and 2, Henry Co.; 2.863 mi. Non-System Hy., WPSO 439-A, Putnam and Smith Counties; 0.962 mix hy., WPGS 471-A, Franklin Co.

†**Wyoming**—May 22, by Bu. Pub. Rds. Denver, Colo., asphaltic material processing roadways on 37.304 mi. Grand Loop South entrance and East Entrance Highways; 3.718 mi. Tower Junction-Cooke County Hy., Yellowstone Natl. Park. J. A. Elliott, dist. engr.

Alta., Edmonton—W. A. Fallow, minister P. Wks., soon takes bids grading, graveling 26 mi. from Lethbridge to Iron Springs; rebuilding 50 mi. road from Edmonton to Wetaskiwin.

N. B., Fredericton — Provincial Govt. soon takes bids constructing 40 mi. Tobique to Miramichie Rd., 22 ft. from shoulder to shoulder, $400,000. (**Correction**—location of project.) Noted May 5, C. D.—May 7, E. N.-R.

CONTRACTS AWARDED

Alabama—State Hy. Comn., c/o G. Scott, pres., Montgomery, grading, draining, rein.-con. bridge 3.012 mi. Tuscaloosa-Duncanville Rd., WPSO 397, Tuscaloosa Co., to W. C. Shepherd, 347 Elizabeth St., N.W., Atlanta, Ga., **$75,067.** Bids Jan. 31. Noted Feb. 10, C.D.

Arizona—State Hy. Dpt., Phoenix, grading, draining, oiling 3 mi. Halbrook St. Johns Hy. beginning 40 mi. southeast of Holbrook and extending toward St. Johns, Apachi Co., to Lee Moor Contg. Co., 206 Two Republic Bldg., El Paso, Tex., **$64,938** est. $113,000***grading, draining 3.9 mi. Phoenix Superior Hy., Pinal Co., to Tiffany Constr. Co., Phoenix, **$117,178** est. $120,000. T. O'Connell, hy. engr. Noted Apr. 8 and 13, C. D.—Apr. 16, E. N.-R.

Calif., San Jose — F. W. Hogan, clk., Santa Clara Co., asphaltic concrete surfacing 277,500 sq.ft. and 2,800 tons asphaltic concrete base, Saratoga Ave., to Union Paving Co., 624 Call Bldg., San Francisco, **$28,410.** Bids Apr. 27, awarded Apr. 30. Noted May 4, C. D.

Connecticut—J. A. Macdonald, state hy. comr., Hartford, to Patterson & Rossi, Inc., 60 Main St., Torrington, waterbound macadam paving 7,910 ft. and loose graveling 31,383 ft. Milford St., Burlington, **$97,841***to S-K Constr. Co., Lebanon, loose gravel surfacing 2,431 ft. Hayward Lake Rd., East Haddam, **$5,180***to New Britain Truck Co., 377 Allen St., New Britain, waterbound macadam paving 3,873 ft. Fieneman Rd., Farmington, **$21,907***to D. Arrigoni, 605 Main St., Middletown, rolled gravel surfacing 22,787 ft. 5 sections hy., Marlboro, **$59,694;** loose broken stone surfacing and 2 bridges 11,287 ft. hy., Middletown, **$37,868;** waterbound macadam, paving 13,986 ft. Hayes Rd. and Shunt Pike, Rocky Hill, **$53,520***to Guyott Constr. Co., 172 Forbes Ave., New Haven, bituminous macadam paving 4,030 ft. Spring St., Naugatuck, **$30,775***to Angelo Tomasso, Inc., 410 Commonwealth Ave., New Britain, 6,775 ft., 7 streets, New Britain, **$36,431***to Bridgeport Constr. Co., Inc., 35 Milne St., Bridgeport, rolled gravel surfacing 19,846 ft. Walnut Tree, Taunton and Huntington Rds., Newtown, **$38,432***to Cerretoni Constr. Co., Railroad Ave., New Canaan, 5,428 ft. Olmstead Hill Rd., Wilton, **$10,789***to Lane Constr. Corp., 35 Colony St., Meriden, bituminous macadam paving 7,204 ft. 6 sections of hy., Windsor Locks, **$34,477.** Grand total $426,914. Bids Dec. 5, awarded early in April. Noted Dec. 13, C. D.

★ **Connecticut** — J. A. Macdonald, state hy. comr., Hartford, waterbound macadam paving 4,750 ft. Parum Rd., Colchester, and 221.5 ft. span Parker Truss and loose gravel surfacing Butts Bridge, Canterbury, to A. I. Savin Constr. Co., 10 Village St., East Hartford, **$28,546** and **$66,471** respectively***waterbound damacadm paving 7,967 ft. Shunt Pike, Cromwell, to White Oak Exc. Co., Inc., 124 Wooster St., New Britain, **$29,216***waterbound macadam paving 7,050 ft. Brookfield Rd., Durham, to D. Arrigoni, 605 Main St., Middletown, **$42,490*****waterbound macadam paving 12,388 ft. Maple St., Wethersfield, and rolled gravel surfacing 28,972 ft. 4 sections hy., Somers, to Bloomfield Constr. Co., Tunxis Ave., Bloomfield, **$41,203** and **$48,421** respectively***alterations to Center Bridge on Main St., Torrington, to Onegha & Gervasini, Inc., Casson Ave., Torrington, **$8,065***bituminous macadam paving 17,200 ft. Woodhouse Rd., Wallingford, to D. V. Frione & Co., Inc., 36 Foxon St., New Haven, **$32,279***loose and rolled gravel surfacing 55,829 ft. 6 sections hy., Lebanon, to John Arborio, Inc., West Cedar St., Poughkeepsie, N. Y., **$96,384***bituminous macadam, asphaltic concrete paving, and bridge 10,389 ft. Railroad Ave. and Silvermine Rd., New Canaan and Wilton, to P. Bacco, 1 Atlantic St., Stamford, **$75,907***rolled gravel surfacing 16,344 ft. 5 sections of road, Putnam, to Medbury & Trowbridge, 289 Main St., Putnam, **$22,380.** Grand total $491,362. Bids Dec. 9, awarded sometime early in April. Noted Dec. 13, C. D.

Conn., Bridgeport—City, bituminous macadam paving 2,560 ft. Barnum Blvd. Owner builds. P. Wks., Dpt., P. Brewster, dir. ▾$26,977. **W.P.A.** F. Toquet, City Hall, engr.

Conn., New Haven — City, asphalt paving Chapel St. and State St., to C. W. Blakeslee & Sons, Inc., 58 Waverly St., **$13,390** and **$49,626** respectively. E. S. Nettleton, Hall of Records Bldg., engr.

Ill., Edwardsville—Dpt. P. Wks., and Buildings, Div. Hys., concrete paving 2.5904 mi. Sect. 60-15d, Madison Co., 18 ft. to Edwardsville Constr. Co., Edwardsville, **$97,239.** Bids Mar. 16. Noted Mar. 13, C. D.

Ill., Elgin—City, rein.-con. paving 4.037 sq.yd. Bluff City Bldg., to Illinois Hydraulic Stone & Constr. Co., Elgin, **$11,681;** rein.-con. paving 21,000 sq.yd. Walnut Ave., to Charles E. Giertz & Son, Elgin, **$48,053.** **P.W.A.** Noted Nov. 19, C. D.

Indiana—State Hy. Dpt., Indianapolis, rein.-con. paving 0.56 mi. State Rd. 6, West Main St., Butler, DeKalb Co., to Brand & Deal, West Beardsley Ave., Elkhart, **$35,683.** Est. $42,689. Bids Apr. 28. Noted May 4, C. D.

Iowa—State Hy. Comn., Ames, grading 0.312 mi. Benton Co., to Burch Constr. Co., Cedar Rapids, **$10,811***10.691 mi. and 2.316 mi. Fayette Co., to G. H. Lowe, Cedar Rapids, **$45,020** and **$12,172** respectively***0.316 mi. Johnson Co., to A. C. Rauenbuemer, Keokuk, **$11,539*****0.757 mi. Mahaska Co., to B. Layton, Muscatine, **$6,672***0.369 mi. and 0.568 mi. Sioux Co., to E. M. Dusenberg, Mason City, **$1,854** and **$13,271** respectively***graveling 7.946 mi. Adair Co., to L. J. Peters, Des Moines, **$10,743*****11.284 mi. Des Moines Co., to M. O. Weaver, 539 5th St., Des Moines, **$22,026***10.691 mi. and 2.316 mi. Fayette Co., to Sargent Bros., Des Moines, **$18,441** and **$4,002** respectively. Grand total $156,551. Bids Apr. 28, awarded Apr. 28. Noted May 4, C. D.—Apr. 23, E. N.-R.

Ia., Fort Madison—Lee Co., M. J. Tucker, aud., grading 7 projects, incl. 432,304 cu.yd. excav., 368,270 station yards overhaul, to J. Ryan, Donnelson, **$70,987.** Awarded May 1.

Ia., LeMars—Plymouth Co., L. A. Ludwig, aud., grading 9.85 mi. secondary roads in Lincoln, Elkhart and Garfield Twps., to Clark Constr. Co., Merrill, **$21,248;** furnishing materials, constructing bridges and culverts on same road, to H. Noel Peterson, **$8,680.** Bids Apr. 27. Noted Apr. 21, C. D.

Kansas—State Hy. Comn., at office County Clerk, Marion, earthwork, culverts 1.392 mi. P. 24-23-FA 284H, Clay Co., to D. L. Wheelock Constr. Co., Clay Center, **$8,726***3.814 mi. P. 36-24B-FA 449G, Washington Co., to T. F. Marbut, Emporia, **$67,314***0.368 mi. P. 77-10-WPGH 240D, Marion Co., to Geiger & Rutherford, Leavenworth, **$33,272***3.62 mi. P. 15-16-FA 370E, Dickinson Co., to Perry Constr. Co., Oberlin, **$37,187***light type surfacing 1.392 mi. P. 24-23-FA 284H, Clay Co., to J. I. Cowell, Clay Center, **$1,396***paving, light type surfacing 2.119 mi. P. 81-23-FA 186D, Cloud Co., to Sandy Hites Constr. Co., City Bank Bldg., Kansas City, **$52,466***channel change and jetty construction, P. 81-23-FA 186A, Cloud Co., to List & Clark Constr. Co., Ry. Exchange, Kansas City, **$27,648***resurfacing 15.3 mi. P. 9-15-6798, Cloud Co., road maintenance project, to D. G. Hansen, Logan, **$4,529***limestone covering material 11.2 mi. P. 4-9-6801, McPherson Co., to San Ore Constr. Co., McPherson, **$1,462***constructing steel deck girder viaduct, Br. 11.2, P. 77-10-WPGH

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Streets and Roads (Continued)

240D, Marion Co., to Carrothers & Crouch, B. M. A. Bldg., Kansas City, **$78,181*****construcing eight 24 ft. rein.-con. I-beam deck pile trestle, P. 15-16-370E. Br. 14.2, and sixteen 25 ft. rein.-con. I-beam deck pile trestle, P. 15-16-FA 270E. Br. 14.7, both Dickinson Co., to Central Constr. Co., Hoisington, **$10,024** and **$19,057** respectively. Grand total $344,262. Bids Apr. 24. Noted Apr. 14, C.D.—Apr. 16, E. N.-R.

Kansas—State Hy. Comn., Anthony, earthwork, culverts 0.608 mi. WPMS 551A, and 9.77 mi. WPSO 551A, both Harper Co., to Banta Constr. Co., Harper, **$4,164** and **$88,851** respectively*****8.916 mi. WPSO 536A and 0.523 mi. WPMS 536A, Reno Co., to Stamey & Tidd, Hutchinson, **$55,384** and **$2,813** respectively***0.423 mi. P. 50S-12-WPGM 302H, Edwards Co., to H. J. Taylor Constr. Co., Salina, **$22,542*****sand clay surfacing 0.613 mi. WPMS 551 A and D, and 9.779 mi. WPSO 551 A and D, Harper Co., to Cook & Cone, Ottawa, **$1,389** and **$22,150** respectively. Grand total $197,294. Bids Apr. 30. Noted Apr. 14, C.D.—Apr. 16, E. N.-R.

★**Kansas**—State Hy. Comn., Lawrence, earthwork, culverts, paving 0.373 mi. P. 50S-33-WPGH 30C, Lyon Co., to C. J. McCoy, Emporia, **$66,477*****earthwork, culverts 1.256 mi. P. 24-7A-FA 524B, Jackson Co., to Inland Constr. Co., Topeka, **$37,179*****constructing Br. 1.0 viaduct, P. 50S-33-WPGH 30C, Lyon Co., to M. E. Gillioz, Monett, Mo., **$98,556*****Br. 0.6, rein.-con. deck girder and 60x80x60 ft. I-beam spans, P. 24-7A-FA 524B, Jackson Co., to Rhoades Constr. Co., Newton, **$35,276***** subway 48 ft. 4 in. steel span, P. 40-34A-WPGM 273G, Douglas Co., to R. C. Bridge Co., B. M. A. Bldg., Kansas City, **$267,106.** Grand total $504,594. Bids Apr. 25. Noted Apr. 14, C.D.—Apr. 16, E. N.-R.

La., Shreveport—City, concrete paving Linden St., Wilder Place and Elmwood St. between Highland Ave. and Creswell St. and Highland Ave. between Stephenson and Elmwood Sts., to Flenniken Constr., Shreveport, **$33,619;** concrete paving Boulevard between Gilbert St. and Centenary Blvd., to R. O. Marks, Shreveport, **$13,878.**

Maine—State Hy. Comn., L. D. Barrows, ch. engr., Augusta, gravel surfacing 0.65 mi. WPMS 352, Waterville, and 0.53 mi. WPMS 349-A, Portland, to Wyman & Simpson, Inc., 284 Water St., Augusta, **$38,007** and **$17,036** respectively ***1.51 mi. WPGH 25 and 39, Littleton and Monticello, to Chas. E. Horne, North Maine St., Millbury, Mass., **$31,784.** Grand total $86,827. Bids Apr. 29, awarded May 4. Noted May 5, C. D.

Mass., Arlington—Town, E. O'Brion, supt. Dpt. P. Wks., bituminous macadam or sheet asphalt paving Glenn Ave., $6,700***Edmund Rd., $6,900; Argyle Rd., $7,300; Dundee Rd., $12,000; Peter Tufts Rd., $8,200; Ottawa Rd., $12,800; Hibbert St., $14,300; Lockeland Ave., $7,800; day labor under **W.P.A.** Grand total $76,000. Owner purchases materials.

Mass., Clinton—Town, A. R. Philbin, chn. Bd. Selectmen, Town Hall, Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, comr., 100 Nashua St., Boston, 2 in. bitulithic concrete Type "E," 5 in. concrete paving High St., P.W.A. Project 1097-R, Clinton, to J. J. Callahan, 119 Park St., West Roxbury, **$31,908.** Awarded May 5.

†**Mass., Hingham**—Yards & Docks, Navy Yard, Boston, repairing bituminous macadam or concrete paving streets at Ammunition Depot, day labor, $80,000. **W.P.A.** project. Owner purchasing materials.

Mass., Medford—City, J. C. Gillis, street comr., bituminous macadam resurfacing Winthrop St., day labor. Est. $26,000.

Mass., Milford—Town, F. J. Coleman, W.P.A. Co-ordinator, Town Hall, constructing concrete sidewalks on various streets, day labor under **W.P.A.** Est. $200,000. Owner purchases materials.

Mass., Salem—City, Street Dpt. City Hall, crushed stone and tar or bituminous macadam surfacing Cross and Perkins Sts., $10,000; Summit Ave., Saunders, Varney and Vale Sts., $10,000; Grafton St., $5,000; Barstow, Conant and Federal Sts., $10,000; Wisteria, Warner and Roslyn Sts., $5,000; Fowler, Laurel, Lathrop and Pearl Sts., $15,000; vitr. clay sewer in Maple and Elm Aves., $5,000 each, relief labor under **W.P.A.** Grand total $65,000.

Mass., Taunton—City, J. Foley, supt. Street Dpt., bituminous macadam paving various streets, day labor. Est. $70,000. City will purchase materials.

Mass., Whitman—Town, E. C. Monroe, chn. Bd. Selectmen, Town Hall, concrete sidewalks, curbing various streets by day labor under W.P.A. Owner purchases materials. Est. about $55,000.

★**Missouri**—State Hy. Dpt., Jefferson City, to E. E. DeLaney, Holcomb, grading, graveling 0.685 mi. Perry Co., **$2,431;** 1.101 mi. Madison Co., **$4,443;** 0.405 mi. Bollinger Co., **$1,940*****to H. R. Fisher, Poplar Bluffs, 0.625 mi. in New Madrid Co., **$18,241;** 0.047 mi. Mississippi Co., **$4,025*****to Davis Constr. Co., Boonville, 4.988 mi. Route 50-Latham Rd., WPSO 659B, **$21,360;** 1.89 mi. same road, Sect. WPSO 659A, **$13,772,** both Moniteau Co.*** to F. T. O'Dell, Hannibal, 3.831 mi. Iron Co., **$35,509*****to Vaughn Constr. Co., Kirksville, 0.217 mi. DeKalb Co., **$14,257*****to C. J. Williams, Monett, 0.625 mi. Dallas Co., **$12,852**

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*****to F. M. Clark, Savannah, 0.066 mi. ... son Co., **$16,980*****to C. H. Atkinson ... Co., Chillicothe, 2.295 mi. Buchanan Co., ... **527*****to C. H. Atkinson Paving Co., ... cothe, and to Condon, Cunningham & ... Co., Kirkwood, 0.151 mi. road in St. ... **$185,630*****to J. R. Hancock, St. Louis, ... mi. Madison Co., **$67,704*****to Kelly & ... wood, Granby, 0.306 mi. Bollinger Co., $1... Grand total $558,845. Bids Apr. 10. R... bids Mar. 13, road in Chariton Co. Noted 16, C. D.—Apr. 2, E. N.-R.

★**Nebraska**—State Dpt. Roads & Irrig... Lincoln, to G. W. Condon Co., 208 Gra... change Bldg., Omaha, grading 0.6 mi. ... son Co. **$14, 904;** culverts on same road ... *****to Western Asphalt Paving Corp., ... City, Ia., viaduct in Jefferson Co. **$47,943***** F. C. Krotter & Son, Imperial, stabilizing ... 6.9 mi. Chase and Hayes Counties, **$7,223***** Abel Constr. Co., 900 North 16th St., Lin... and to Einung Bros., Lincoln, bituminous ... dam paving same road **$27,317;** 12 mi. P... Co., **$46,774;** 9.7 mi. Pierce and Cedar ... ties **$37,207;** 14.1 mi. Harlan Co. **$52,650***** Joyce & Co., Kansas City, Mo., 5.7 mi. ... and Dawes Counties **$24,076;** 12.9 mi. D... Co. **$84,034*****to P. Kiewitt Sons, 1024 Om... Natl. Bank Bldg., Omaha, stabilizing base ... mi. Madison Co. **$9,510;** bituminous mac... paving same road **$40,662*****to M. M. Lu... cott, Hastings, graveling 22.2 mi. Rock ... $4,895*****11.8 mi. road in Rock and Keya P... Counties **$2,382*****to W. B. Hall, Stratton, ... mi. Red Willow Co. **$919*****to Platte V... Constr. Co., Grand Island, 14.1 mi. Harlan ... **$6,944*****to Orshek & Christensen, Cedar Rapids, 3.3 mi. Boone Co. **$2,942;** 8.9 mi. Custer ... **$1,818,** culverts in Richardson and Nem... Counties **$11,096*****to W. B. Knight, Chapman, grading 3 mi. Dawson Co. **$8,943*****to Nichols Constr. Co., Geneva, culverts on same ... **$4,116*****bridge on same road $4,333; ma... tenance graveling 7 mi. Saline Co. **$1,411***** to Inland Constr. Co., 3867 Leavenworth St., Omaha, graveling 6 mi. Boyd Co. **$1,250*****to J. S. Jones, Wymore, 5.4 mi. Pawnee Co. **$2,551*****to Weiderner & King, Fremont, 14.6 ... Cherry Co. **$6,798*****to Third City Sand Co., Grand Island, 6.2 mi. Keya Pasha Co. $1,772. Grand total $400,720. Bids Apr. 30. Rejected bids Apr. 30, improving roads in Cherry, Chase, Antelope, Seward, Boyd and Keya Pasha Counties. Noted Apr. 16, C. D.—Apr. 23, E. N.-R.

Nevada—State Hy. Comn., Carson City, asphaltic road mix surfacing 12.25 mi. between Alamo and Crystal Springs, Lincoln Co., to G. French, Jr., Box 107, Stockton, Calif., **$21,173;** 20.36 mi. between Coaldale & Rhodes, Mineral Co., to U. B. Lee, San Leandro, Calif., **$27,281.** Noted Apr. 24, C.D.—Apr. 30, E.N.-R.

New York—Dpt. P. Wks., Albany, graveling 0.96 mi. Carmel-Kent Rd. and Kent-Towner Rd., Putnam Co., to John Arborio, Inc., Poughkeepsie, **$88,405** est. $114,333; roadside improvement New Lebanon-Brainard Hy., 615 Columbia Co., to F. B. Nelson & Son, 42 East Ave., Rochester, **$24,774** est. $31,586. Bids Apr. 28. Received no bids Apr. 28, improving 6.25 mi. Hawthorne Hill Rd., WPSO 874-A, Herkimer Co., and 6.57 mi. Starkville-Hessville Rd., and Salt Springville-Rex Rd., Montgomery Co. Noted Apr. 9, C. D.—Apr. 16, E. N.-R.

★**New York**—A. W. Brandt, comr. Hys., Albany, improving 19.6 mi. road in Erie Co., to Holmes & Murphy, Orchard Park, **$82,647** est. $108,158*****2.99 mi. Westchester Co., to Garofano Constr. Co., Inc. and Rusciano & Son Corp., 700 South Columbus Ave., Mount Vernon, **$633,217** est. $759,279*****0.78 mi. Monroe Co., to T. Holahan Co., Inc., 164 Lewis St., Rochester, **$97,551** est. $131,136*****1.28 mi. Westchester Co., to Linn Avenue Constr. Corp., 166 Yonkers Ave., Yonkers, **$157,238** est. $176,300*****0.77 mi. Niagara Co., to Pekin Stone Products Corp., Lockwood, **$77,754** est. $86,160 *****roadside improving in Rensselaer Co., to F. B. Nelson & Son, 42 6th Ave., Rochester, **$24,960** est. $34,048. Grand total $1,073,367. Bids Mar. 17. Rejected bids Mar. 17, improving road in Chenango Co. Noted Mar. 20, C. D.—Mar. 12, E. N.-R.

N. Y., Albany—City, City Hall, repairing streets, bridges and public property destroyed by floods, relief labor, $122,090. **W.P.A.** J. W. Carroll, Old Post Office Bldg., procurement officer W.P.A., will purchase materials.

N. Y., Albany—Bd. Supervs. Albany Co., Albany, retreading 2.1 mi. Unionville Rd., $60,000-$75,000; reconstructnig 20 ft. roadway on Delmar-Slingerlands Rd., $40,000; macadam and concrete paving 2 mi. Bethlehem Center-Feura Bush Rd., $100,000, by own forces, $250,000. Owners will purchase materials. Funds received from New York State gasoline tax share.

N. Y., Champlain—Village, guttering, paving 1.5 mi. Goldie Clark Rd., relief labor. Est. about $23,000. **W.P.A.** J. F. Leeds, South Street School, Glens Falls, procurement officer W.P.A., will purchase materials.

N. Y., Ellenburg—Village, repaving and guttering Plank Rd. from Ellenburg Center to Gordon Rd., relief labor. Est. about $23,000. **W.P.A.** J. F. Leeds, South St. School, Glens Falls, procurement officer W.P.A., will purchase materials.

N. Y., Little Valley—Cattaraugus Co., repairing and improving with bituminous surfacing 13 county roads and building 3 new county roads, own forces. $163,975.

N. Y., Lyons—Wayne Co., to A. Cleason, Palmyra, reconstructing 2.55 mi. Hydesville Rd., Arcadia, **$19,489;** 3.2 mi. Wallington Rd., Sodus,

†*Federal Government*

Streets and Roads (Continued)

$26,123; trestle in Walworth, **$4,196.** Grand total $30,108. Est. $51,110. L. Barnes, co. engr.

N. Y., Minden—Village, repairing, guttering, paving Ripple Corners Rd. from County Roads 57-1 to 56-1, relief labor. Est. about $23,000. **W.P.A.** J. W. Carroll, Old Post Office Bldg., Albany, procurement officer W.P.A., will purchase materials.

N. Y., Niagara Falls—City, City Hall, widening, bituminous surfacing Whirpool St. from Cedar to Cleveland Aves., to Pekin Crushed Stone Co., Niagara Falls. Est. $80,000. **P.W.A.** H. W. Clark, city engr.

N. Y., Niskayuna—Village, repairing, guttering, surfacing Barcelona, Millington, Highland Park and Hillcrest Rds., Baker, Keyes and Florence Aves., Dean, Myron, Regent, Valencia, Castine, Amherst and Becker Sts., relief labor, $40,923. **W.P.A.** Materials to be purchased by W.P.A.

N. Y., Rochester—Dpt. Mental Hygiene, State Office Bldg., Albany, sidewalks and roads at Rochester State Hospital, relief forces. Est. about $50,000. **W.P.A.** A. Hackett, 1460 South Ave., Rochester, procurement officer W.P.A., will purchase materials.

N. Y., Saranac — Village, constructing road and guttering Picketts Corner Rd., northerly for 6 mi., relief labor. $45,000. **W.P.A.** J. F. Leeds, South St. School, Glens Falls, procurement officer W.P.A., will purchase materials.

N. Y., Saugerties—Village, widening and paving 1 mi. Platte Clove Rd., relief labor. To exceed $20,000. **W.P.A.** J. W. Carroll, Old Post Office Bldg., Albany, procurement officer W.P.A. will purchase materials.

N. Y., Schenectady—City, City Hall, reconstructing streets and bridges for flood rehabilitation, by relief labor. $49,133. **W.P.A.** Owner will purchase materials.

N. Y., Van Buren—Bd. Supervs. Onondaga Co. constructing 2.7 mi. Perry Rd., own forces. Est. about $23,000. Owner will purchase materials.

N. Y., Wampsville—Madison Co., L. E. Johnson, co. hy. supt., reconstructing 19 mi. highways, own forces. $72,000 appropriated.

North Carolina—State Hy. Comn., Raleigh, concrete paving 0.54 mi. approaches, P. 2180, Duplin Co., to J. M. Gregory, Raleigh, **$31,415.** Bids Apr. 15, awarded May 5. Noted Apr. 23, C. D.

Ohio—J. J. Jaster, Jr., state hy. dir., Columbus, drainage structures, grading, brick paving 0.104 mi., constructing stone faced spandrel filled concrete arch bridge CU 175-154, over branch of Euclid Creek, Cuyahoga Co., to D. Nero Constr. Co., 1512 Guarantee Title Bldg., Cleveland, **$74,392** est., $74,729; reconstructing existing separated crossing with N. Y. C. R.R. Co., incl. grading, drainage structures, roadside improvement 0.12 mi. part Triskett Rd., Cuyahoga Co., to Lowensohn Constr. Co., 1740 East 12th St., Cleveland, **$165,906** est. $169,837. Bids May 5. Noted Apr. 28, C. D.—Apr. 30, E. N.-R.

O., Cleveland—City, 72,000 sq.ft. 6 in. concrete walk, 500 lin.ft. marble curb, 3,600 lin.ft. cork expansion joint, 4,000 lin.ft. curb slab and 11 control valves, to P. H DeSanits, 12510 Britton Dr. **$28,262.** J. Fratoe, engr.

O., St. Clairsville—Comrs. Belmont Co., asphalt paving Bonnoock-Lafferty and Chermont Rds., to Tri-State Asphalt Co., Martins Ferry, **$37,351.** A. C. Murphy, St. Clairsville, engr.

★ **Pa., Lock Haven** — Clinton Co., repairing hys. and bridges throughout county, damaged by flood $890,245. County Engineer, in charge***Lock Haven Boro, R. S. Kift, engr., repairing sidewalks, $1,621; painting interior of Junior High School, $2,300***Wayne Twp., reconstructing bridge and road, $8,214***Pine Creek Twp., reconstructing drainage and roadbed, $13,453***Bald Eagle Twp., drainage project, $2,655, day labor. Grand total $918,488.

Pa., Pittsburgh—City, street improvement, Woodruff St., and grading, paving, curbing, Merrimac St., to D. Dinardo, 333 Boquet St., **$6,735** and **$28,644** respectively***sewer in Edington Ave., to V. Manella, 6300 Elby St., **$1,369***repairs to Schenley Park Bridge and public sewer in Lappe Lane, to Bucci Constr. Co., 375 Boquet St., **$4,952** and **$1,190** respectively***retaining wall, to Bigelow Blvd., to McDonough & Scanlon, 656 Margaret St., $797. Grand total $43,687.

Rhode Island—Bd. Contracts, Standards & Purchases, State and Providence Plantations, Providence, rein.-con. paving 3.414 mi. Project WPH 85-B and 55-B, Contr. 3506, Smithfield and Glocester, to Lane Constr. Co., 37 Colony St., Meriden, Conn., **$238,146.** Bids Apr. 6, awarded Apr. 28. Noted Apr. 14, C.D.—Apr. 2, E.N.-R.

Rhode Island — Bd. Contracts, Standards & Purchases, State and Providence Plantations, Providence, rein.-con. paving 1.125 mi. Project WPMH 96-A, Contr. 3521, Warwick, to Lane Constr. Corp., 37 Colony St., Meriden, Conn., **$66,211.** Bids Apr. 6, awarded May 1. Noted Apr. 14, C. D.—Apr. 2, E. N.-R.

South Dakota—State Hy. Comn., Pierre, oil surfacing 9.538 mi. F. A. P. 3 Reop. Grant Co., and 8.546 mi. F. A. P. 85 Reop. Clark Co., to C. A. Wagner, Sioux Falls, **$36,382** and **$49,174** respectively***0.321 mi. WPGH 88A Meade Co., to Northwestern Eng. Co., Rapid City, **$5,000***grading 1.022 mi. WPGH and WPGM 83A and B and 121, Beadle Co., to Jarvis, Wright & Howell, Sioux Falls, **$23,335***0.31 mi. WPGH 152C, Roberts Co., to Thompson & Herreid, Summit, **$2,559***4.367 mi. F. A. P. 182C-FLHP 3 and 5.554 mi. F. A. P. 182B, Buffalo Co., to R. P. England, Mitchell, **$28,954** and **$41,054** respectively***0.567 mi. WPGH 184A, Spink Co., to A. Graff & Co., Bismarck, **$32,924***6.926 mi. WPGS 413, Fall River Co., to G. W. England & Son, Rapid City, **$38,768***roadside improvement 0.68 mi. NRM 81, Beadle Co., to House of Gurney, Yankton, **$1,439***6.947 mi. WPH 149A and B, Spink Co., to G. W. Gurney Nursery, Yankton, **$3,499***8.292 mi. NRH 177A, Pennington Co., to N. O. Monserud, Sioux Falls, **$4,996***306 ft. overhead crossing and three 9x8 ft. box culverts, WPGH 83-A, Kingsbury Co., to A. L. Hyde, Watertown, **$33,979***152 ft. overhead crossing WPH 152 C, Roberts Co., to A. Herreid, Summit, **$14,966***62x54 ft. bridge F. A. P. 182-B, Buffalo Co., to Western Asphalt Paving Corp., Sioux City, Ia., **$21,702***234 ft. bridge WPGH 184 A, Spink Co., to W. Bonstell, Wagner, **$22,646***83 ft. bridge three 8x6 ft., two 10x3 ft., two 10x8 ft. box culverts WPGS 413, Fall River Co., to W. P. Duffy, Winner, **$13,307.** Grand total $384,404. Noted Apr. 28, C.D.—May 7, E.N.-R.

Tennessee—State Hy. Dpt., Nashville, grading, drainage, paving of relocation of 0.595 mi. State Hy. 1, Carroll Co., to T. M. Strider, Cotton States Bldg., Nashville, **$29,775;** grading, drainage 4.947 mi. Non-System Hy., Bedford Co., to B. G. Young, Ashland City, **$88,279.** Bids Apr. 17. Noted Apr. 2, C. D.—Apr. 30, E. N.-R.

Wash., Ritzville—Adams Co., grading, surfacing 3.07 mi. Richardson-Owens Rd., to Joslin & McAllister, East 3038 Trent St., Spokane, **$30,213.** Noted Apr. 15, C. D.

Wis., Racine—Racine Co., concrete paving 12th St., to Western Impvt. Co., Racine **$31,850;** retaining wall, to A. C. Jensen, Racine, **$13,632. P.W.A.** Noted Apr. 22, C. D.—Apr. 30, E. N.-R.

Wash., Seattle—City, paving Railroad Ave. and sewer in Fourth Ave. S., to Queen City Constr. Co., 603 18th St. S., **$25,830** and **$2,432** respectively***paving 20th Ave. N.W., to Northwest Constr. Co., 3950 Sixth St. N.W., **$5,323***sidewalks on 23rd Ave., to T. Romano, 1833 Dearborn St., **$984.** Grand total $34,569. Noted May 7, C. D.—May 14, E. N.-R.

Wisconsin—State Hy. Comn. and Jackson Co. Hy. Comm., La Crosse, grading, drainage, shale base course 0.284 mi. Pray City Point Rd., State Project 5532, S.T.H. 54, to L. H. Jessop, Black River Falls, **$7,568***grading, drainage, shale base course, gravel surfacing 1.63 mi. Galesville North Bend Rd. State Project 5230, S.P.H. 54, Jackson Co., to L. G. Arnold, Inc., Eau Claire, **$43,571***constructing one 60 ft. I-beam span bridge, Galesville North Bend Rd., State Project 5230, S.T.H. 54, Jackson Co., to M. Schroeder, Cashton, **$29,050***constructing one 30 ft. I-beam span bridge, Pray City Point Rd., State Project 5532, S.T.H. 54, Jackson Co., to Chippewa Engr. Co., Holcombe, **$9,494.** Grand total $89,686. Bids Apr. 28. Noted Apr. 17, C.D.—Apr. 23, E.N.-R.

Wisconsin—State Hy. Comn., Lancaster, to Wisconsin Blacktop Co., Madison, applying 418,000 gal. bituminous material for skin mat work, A.F.E. 12-37, 12-38, 12-39, Crawford Co., **$1,096;** 148,000 gal. A.F.E. 33-38, 33-39, Lafayette Co., **$1,554;** 42,000 gal. bituminous material seal coat work, A.F.E. 12-35, Crawford Co., **$412***to P. W. Ryan Sons, Janesville, crushed stone surfacing 3,500 cu.yd. Mt. Sterling North County Line Rd., A.F.E. 12-35, **$4,620;** 3,200 cu.yd. Boscobel Readstown Rd., A.F.E. 12-34, **$1,704,** both Crawford Co.***to A. W. Gallagher & Son, Madison, 6,500 cu.yd. Mt. Hope Boscobel Rd., S.T.H. 132, **$7,995;** 3,000 cu.yd. North Andover Bloomington Rd., S.T.H. 133, **$4,110,** both Grant Co.***to Stewart Watson Constr. Co., Barneveld, 9,200 cu.yd. Montford Fennimore Rd., A.F.E. 22-38, Grant Co., **$10,918***to H. F. Riese & Son, Albany, hauling, placing mine tailings 4,200 cu.yd. Hazel Green East Dubuque Rd., S.T.H. 11, A.F.E. 22-50, **$2,562;** 2,700 cu.yd. Dickeyville Rd., A.F.E. 22-54, Grant Co., **$1,512;** 5,600 cu.yd. Mineral Point Linden Edmund Rd., S.T.H. 62, A.F.E. 25-42 and 25-44, Iowa Co., **$2,296***to D. A. Senn, Osseo, applying 170,000 gal. bituminous material turnover work, A.F.E. 22-58, Grant Co., **$1,955.** Grand total $47,094. Bids May 1. Noted Apr. 23, C. D.

Wis., Metomen—City, graveling roads, Sects. A and B, to H. A. Raemisch, Dane, **$15,653** and **$26,964** respectively; Sect. C, to Kopplin & Williams, Green Lake, **$24,312.** Grand total $66,934.

†**Alaska**—Pub. Rds., Juneau, surfacing Mitkof Hy. to Wright & Stock, Lowman Bldg., Seattle, Wash., **$7,450.** Bids Apr. 2. Noted Apr. 14, C. D.—Mar. 19, E. N.-R.

EARTHWORK, IRRIGATION, DRAINAGE AND WATERWAYS

PROPOSED WORK

Calif., Redwood City—City, election June 2, $200,000 bonds to supplement federal funds to finance deep water port, here, dredging.

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†*Federal Government*

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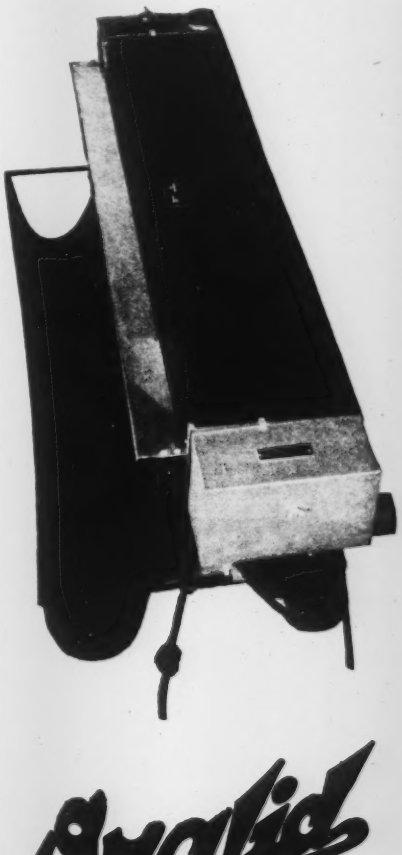

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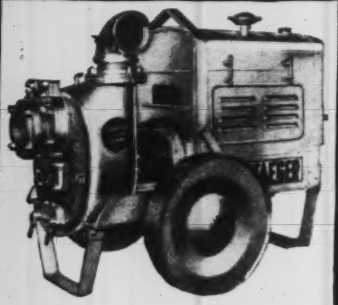

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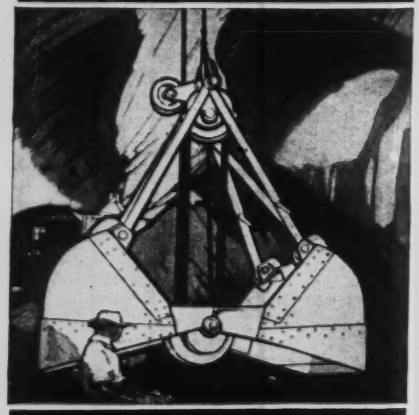

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BAY CITY, MICHIGAN
New York, Philadelphia, Cleveland, Chicago
Agents in principal cities

Earthwork, etc. (Continued)

docks, etc. C. Dimmitt, city engr. Noted Dec. 3, C. D.—Dec. 5, E. N.-R.

Kan., Silver Lake—Silver Lake Kan. River Bd. voted dike repair. $150,000.

Mich., Saginaw—See "Unclassified."

★ **New York**—Dpt. P. Wks., Albany, plans constructing detention dams and reservoirs in various parts of State for flood control measure. $500,000. Owner requested Legislature to appropriate $300,000 for purchasing easements and rights-of-way. T. F. Farrell, state hy. engr.

N. Y., Binghamton—City, C. A. Harrell, mgr., City Hall, plans constructing concrete, steel flood dike in McDonald Ave., for flood control. Plans to issue $100,000 bonds to finance part of cost. J. A. Giles, city engr.

N. Y., Buffalo—Bd. Supervs. Erie Co., County Bldg., plans straightening Scajaguada Creek, beyond city limits, for flood control and eliminating 3 bridges in Cheektowaga. To exceed $17,500.

N. Y., Elmira—City, C. C. Hunter, mgr., City Hall, plans construction of widening, straightening Newtown Creek, and strengthening Chemung River dikes between Estey Rd. and Liberty St., for flood control projects. May apply for federal funds.

†**N. Y., Westfield**—U. S. Eng., Buffalo, preliminary plans for general improvement of Barcelona Harbor, Lake Erie, 2 mi. north of here. $400,000.

†**N. C., Hamilton**—U. S. Eng., Norfolk, plans dredging to restore 10 ft. channel from mouth of Roanoke River to Hamilton. $30,000.

Okla., Oklahoma City—City, City Hall, made plans dredging 525,000 cu.yd. in North Canadian River from Walker St. to Western Ave., and 1,500 ft. 24 in. rein.-con. pipe for sewer extension. $130,000. T. G. Banks, city engr.

Vt., Bennington—Town, C. P. Hogan, clk., and State of Vermont, plans widening and deepening river channel. To exceed $100,000. **Maturity indefinite.** Private plans by State upon maturity.

Ont., Windsor—Confederation Coal & Coke Ltd., C. S. K. Robinson, mgr., making plans dredging and dock piling wharf. $25,000.

BIDS ASKED

†**Idaho and Oregon**—May 21, by Bureau Reclamation, Denver, Colo., constructing structures on North Canal, Laterals Station 45.4 and 49.4 Dead Ox Flat Div., Owyhee Project, incl. 1,850 cu.yd. structural excav. R. F. Walter, Denver, Colo., ch. engr.

★ †**Massachusetts**—U. S. Eng., Custom House, Boston, Mass., taking bids dredging to depth of 25 ft. between Stations 37 plus 00 and 70 plus 00; dredging to depth 32 ft. from Station 70 plus 00 to Station 490 plus 00; removing bridge piers at Station 379 plus 65, and Station 432 plus 40 in Cape Cod Canal; dredging to depth of 17 ft. in channel dredging into Onset Bay involving 8,990,100 cu. yd. excav., at Bourne and Buzzards Bay. **$1,500,000.**

†**Mich., Detroit**—June 2, by U. S. Eng., Detroit, labor and equipment for earth and road dike for compensating dike in Detroit River in vicinity of Sugar Island, side slopes of section 1 to 1½, depth of water 6 to 14 ft., width of dike on top, 10 ft., length 3,000 ft. Est. about $50,000.

†**N. Y., New Rochelle**—May 26, by U. S. Eng., Army Bldg., 39 Whitehall St., New York, dredging 20,070 cu.yd. place measurement in New Rochelle Harbor.

N. Y., Union—See "Contracts Awarded."

N. Y., Utica—See "Contracts Awarded."

Pa., Hanover—See "Contracts Awarded."

Tex., Fort Worth—May 28, by Tarrant Co. Water Control & Impvt. Dist. 1, C. A. Hickman, pres., earthen levee extensions, gate structures, reinforcing steel, clearing, grubbing and sodding. $50,000. P.W.A. project. Hawley & Freese, Capps Bldg., engrs. Noted May 4, C.D.

†**Washington**—May 28, by Bureau Reclamation, Yakima, constructing Tunnel 1, Station 5938 to Station 102, Yakima Ridge Canal, Roza Div., Yakima Project, incl. 8,390 cu.yd. opening cut excav.; 49,100 ft. excav. in tunnel. J. C. Page, acting comr.

†**Washington**—May 28, by Bureau Reclamation, Custom House, Denver, Colo., five 17x37 ft. radial gates for installation in spillway at Cle Elum Dam, Yakima Project.

†**Wyoming**—May 26, by Bureau Reclamation, Custom House, Denver, Colo., two 96 in. diam. ring-follower gates for installation in gate chamber of outlet works at Alcova Dam, Casper-Alcova Project.

CONTRACTS AWARDED

†**Calif., Sacramento**—U. S. Eng., levee construction in Sacramento River, to R. L. Oakley & J. P. Immet, 801 South Grand View, Los Angeles, $106,471. Bids Apr. 9. Noted Apr. 2, C. D.

Ia., Council Bluffs—City, constructing flood control storm sewer for Indian Creek Flood Control Project, Sect. 5, to Kerns Constr. Co., Omaha, Neb., $367,000. **P.W.A.** E. A. Wickham, Council Bluffs, who was awarded contract failed to post bond and contract given to next low bidder, but Wickham will sub-contract part of job at $100,000. Bids Mar. 24 and 25. Noted Apr. 3, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

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★ †**New Mexico**—Bureau Reclamation, El Paso, Tex., constructing Caballo Dam on Rio Grande River, to Mittry Bros. Co., c/o 5531 Downey Blvd., Los Angeles, Calif., $957,018. Bids Apr. 2. Noted Apr. 7, C. D.—Mar. 19, E. N.-R.

N. Y., Union—Bd. Supervs, Broome Co. Court House, Binghamton, check dams in creeks and streams throughout county as flood control measure to prevent soil erosion and other damage, a demonstration dam is being constructed on property of W. H. Hill by relief labor financed by W.P.A. under supervision W. H. White, engr., c/o owner. If project proves successful, similar dams will be built throughout the county. A. Calabriso, Telephone Bldg., Binghamton, N. Y., procurement officer W.P.A., will purchase materials.

N. Y., Utica—City, City Hall, repairing and rebuilding Grace Creek Conduit in Ea. Utica, incl. rein.-con. work additionally reinforced with steel strips and plates, relief labor. To exceed $17,500. **W.P.A.** D. Mahoney, Hotel St. Utica, procurement officer W.P.A., will purchase materials.

Pa., Hanover—Borough, changing course of Forney Run channel through borough, day labor under J. Langen, engr., Newton. Est. $5,249. Noted Feb. 24, C. D.—**Feb. 27, E. N.-R.**

†**Pa., Pittsburgh**—U. S. Eng., furnishing, installing one set lower lock gates, Emsworth Locks, Ohio River, to Dravo Contg. Co., Neville Island, Pittsburgh, $88,800. Bids Mar. 31.

Tex., Port Arthur—Beaumont Navigation Dist., Goodhue Bldg., Beaumont, rein.-con. steel regulating dam on Taylor's Bayou, near here, to Spence & Howe Constr. Co., Port Arthur, $49,856. **P.W.A.** Bids Apr. 14. Noted Mar. 30, C. D.—Apr. 2, E. N.-R.

FEDERAL POWER COMMISSION

Applications for Licenses and Permits Licenses

1366—Southern California Edison Co. Ltd., 601 West 5th St., Los Angeles, wants license for constructing transmission line in Ventura Co., affecting lands in Santa Barbara Natl. Forest.

1367—Mrs. C. M. Beaty, Weldon, Calif., wants license for power project on Fay Creek in Kern Co., affecting lands in Sequoia Natl. Forest.

1368—F. M. Stump, Crescent City, Calif., wants license constructing power project on Rock Creek in Del Norte Co., Calif., affecting lands in Siskiyou Natl. Forest.

1369—C. H. Van Norman and F. B. Krater, Independence, Calif., wants license constructed power project on Independence Creek, Inyo Co., Calif., affecting lands in Inyo Natl. Forest.

1370—Southern Sierras Power Co., and Hillside Water Co., Riverside, Calif., wants license constructed power project on South Fork of Bishop Creek, in Inyo Calif., affecting lands in Inyo Natl. Forest.

UNCLASSIFIED

PROPOSED WORK

★ **California**—OIL PIPE LINE—Shell Oil Co., J. U. Stair, vice-pres. in charge of production, 1008 West 6th St., Los Angeles, plans being completed and bids will soon be called for 304 mi. new oil pipe line, involving 90 mi. 8 and 10 in. line between Bakersfield and Caliola; 180 mi. 10 in. line from Caliola to Martinez; 44 mi. 6 and 8 in. gathering lines and 4 pumping stations between Caliola and Bakersfield; re-equipment of pumping stations between Caliola and Martinez. Owner will purchase pipe amounting to approximately 25,000 tons, direct and separate contracts will probably be let for laying each section, for welding and for construction of pumping stations. Est. $4,500,000.

Calif., Bakersfield—SWIMMING POOLS—City making surveys for 3 municipal swimming pools. To exceed $100,000. J. Hollender, city engr.

Calif., Huntington Park—SWIMMING POOL—City, plans swimming pool in Huntington Park Municipal park. W.P.A. approved $54,000 grant. Total est. $120,000. Noted Feb. 14, C. D.—Feb. 20, E. N.-R.

★ **Colorado and Utah**—TRACK IMPROVEMENTS—Denver & Rio Grande Western R.R., A. O. Ridgway, ch. engr., Denver, Colo., plans general track and shop improvements, incl. rail and track materials, $148,600; bridges and trestles, $149,644; slag ballast, $77,000; cut and fill, rip rap, etc., $106,300; shops and equipment, $103,025. Total est. $584,569. Part of $3,000,000 rehabilitation program.

Colo., Holly—DAM—Works Progress Administration, E. S. Stone, Pueblo, dist. engr., preparing plans rebuilding Horse Creek Dam, earth with rock face. $70,000.

Colo., Pueblo—SUNKEN GARDENS—Works Progress Administration, E. S. Stone, dist. engr., Pueblo, preparing plans for sunken gardens, Old Arkansas River Channel, between Victoria and Main Sts. $50,000.

Conn., Hartford—HANGAR—City, c/o Aviation Comn., plans by H. Gibson, et al, c/o W.P.A. Office, 130x133 ft. municipal hangar, Aviation Rd., Brainard Field, to replace hangar destroyed by Connecticut River flood. $114,013. W.P.A. project. T. F. Foley, deputy sponsor agent W.P.A. Noted Feb. 21, C. D.—Feb. 27, E. N.-R.

†*Federal Government*

Unclassified (Continued)

La., Lake Charles—OIL PIPE LINE—Union Sulphur Co. preparing surveys 14¼ mi. 6 in. oil line to run from Old Town Bay oil field with terminal on Calcasieu River, downstream from here. $125,000. Private plans.

La., New Orleans—OIL LINE—Union Sulphur Co., Lake Charles, permission asked of War Dpt. for laying two 6 in. oil lines 2 ft. below the bottom under and across Maple Branch of Bayou D'Inde, and about 500 ft. above the confluence of Maple Branch with Bayou D'Inde in Louisiana; laying two six in. oil lines 2 ft. below the bottom under and across Bayou D'Inde 2.95 mi. above its mouth about 6 mi. west of Lake Charles in Calcasieu Parish.

La., Weeks Island—SPRINKLER SYSTEM—Myles Salt Co., Weeks Island, plans by L. Weil & W. Moses, 427 South Peters St., New Orleans, sprinkler system for Myles Salt Co., and Bay Chemical Co., at Weeks Island. $30,000-$40,000.

Mass., Dorchester—BATHHOUSE, etc.—Commonwealth of Massachusetts, Metropolitan Dist. Comm., Park Div., 20 Somerset St., Boston, making plans 1 story, brick, concrete bathhouse and bathing beach at Malibu Beach. To exceed $25,000. J. M. Gray, 175 High St., Boston, archt. and engr.

Mich., Saginaw—DOCK—E. Lenick & Co., Saginaw, plans 80x800 ft. concrete, steel sheet piling, dock and slip for junk handling dredging to 20 ft. Private plans.

Minn., Aitkin—RURAL ELECTRIFICATION—Aitkin County Rural Co-op. Co., c/o A. W. Hoffman & G. Boyer, Aitkin, plans constructing 100 mi. rural electric distribution lines, $100,000. Approved by Rural Electrification Administration.

★**Minn., Glencoe**—RURAL ELECTRIFICATION—McLeo Co-op. Power Assn., W. Jungclaus, sec., plans 636 mi. rural electric transmission lines. Rural Electrification Admn., granted $650,000 allotment.

★**Mo., St. Louis**—LIGHTING SYSTEM—City Bd. Aldermen considering bill authorizing holding election to pass on $650,000 bonds for completing city electric street lighting in sections of city now illuminated by gas and naptha lamps. Bond election may be held Aug. 4.

N. Y., Brooklyn—ATHLETIC FIELD, etc.—Dpt. Parks, Arsenal Bldg., Central Park, New York, plans by A. Embury, 2nd, c/o owner, athletic field and drainage work at parks and playgrounds, Parade Pl. and Caton Ave. Est. about $37,000.

N. Y., Brooklyn—WADING POOL, etc.—Dpt. Parks, Central Park, Arsenal Bldg., New York, plans by A. Embury, 2nd, c/o owner, wading pool and drainage system, 76th St., 14th and Bath Aves. $37,000.

N. Y., Brooklyn—RETAINING WALL—Dpt. Hospitals, 125 Worth St., New York, plans by J. Lustig, archt. and engr., c/o owner, constructing concrete retaining wall, Clarkson Ave. between Albany and New York Aves. $55,000.

N. Y., Laurelton — SHELTER, etc. — Dpt. Parks, Arsenal Bldg., Central Park, New York, plans by A. Embury, 2nd, c/o owner, shelter and boathouse, Brookville Rd. $38,000.

N. Y., Randolph—GAS DEVELOPMENT—Commercial Gas Co., Rixford, Pa., plans developing Medina sand natural gas area near Randolph, Cattaraugus Co., incl. drilling one or more 4,200 ft. wells, each requiring 3,000 to 3,500 ft. 6⅝ in. steel pipe, collars, etc. $25,000.

N. Y., Rensselaer—ATHLETIC FIELD—Bd. Educ. plans constructing athletic field, incl. baseball diamond, tennis courts and improving 23 acre plot adjoining Van Rensselaer Junior High School. $58,000.

N. C., Columbia—INDUSTRIAL RAILROAD—Foreman-Blades Lumber Co., H. C. Foreman, Vice-pres., plans logging railroad in Goat Neck section of Tyrrel Co. between U. S. Route 64 and Pledger Landing.

Okla., Oklahoma City—GAS PIPE LINE—Barnsdall Refining Co., Tulsa, plans 16,000 lin. ft. 6 in. gas pipe line on Philips, Lindsay and Laird Sts. $30,000. L. J. Knott, Oklahoma City, engr.

Okla., Oklahoma City—GAS PIPE LINE—K. & L. Oil Co., 1st Natl. Bldg., made preliminary plans laying 12,600 lin.ft. 6 in. gas pipe line on Central Ave. $30,000. Private plans.

Okla., Oklahoma City—GAS PIPE LINE—Phillips Petroleum Co., Bartlesville, plans 13,000 ft. 8 in. gas pipe line in Kelley Ave. $30,000. A. H. Riney, Bartlesville, engr.

Okla., Oklahoma City — GAS PIPE LINE — Phillip Petroleum Co., Bartlesville, made preliminary plans 9,600 lin.ft. 10 in. gas line on 22nd and Stiles Sts., $32,000. A. H. Riney, Bartlesville, engr.

Okla., Oklahoma City—OIL PIPE LINE—Anderson Kerr Oil Co., 1st Natl. Bank Bldg., making plans 13,700 lin.ft. 8 in. pipe line on 24th St. $32,000. T. Kerr, 1st Natl. Bank Bldg., Oklahoma City, engr.

Pennsylvania — NATURAL GAS DEVELOPMENT—Equitable Gas Co., 435 6th Ave., Pittsburgh, plans development of natural gas field in Jackson, Perry, Monongahela, Greene, Whiteley and Wayne Twps., Greene Co., incl. drilling 10 or more deep wells. Owner will purchase pipe, connections and other materials. **Maturity soon.** H. H. Pigott, c/o owner, engr.

†**Tex., San Antonio**—NIGHT LIGHTING SYSTEM—Con. Q.M., Fort Sam Houston, constructing night lighting system at Kelly Field. Project temporarily held in abeyance. Bids were scheduled to be opened May 18.

Alta., Lethbridge — OIL WELLS — Sunshine Oil Co. Ltd. plans to develop wells in Dellronita field. Rotary rig, casing, etc., will be purchased. W. L. McKenzie, engr.

N. S., Glace Bay—ARENA—L. Proctor preparing plans artificial ice arena, for Army and Navy Society. To exceed $100,000.

Ont., Brampton — PRIMARY CIRCUITS — Brampton Hydro Comn., G. Ostrander, supt., making plans raising voltage on primary circuits from 2,200 to 4,000 volts, also planning purchase of switching equipment. T. W. Dugan, ch.

Que., Sherbrooke—PARK—T. Trembley, city engr., calls for competitive plans for completing Jacques Cartier Park. $200,000.

★**Sask., Regina**—PIPE LINES—Prairie Gas Co. Ltd., G. C. Rooke, pres., making plans natural gas pipe line from the Bowdoin gas fields in Montana to Regina and Moose Jaw, Sask. $6,000,000 of which $5,000,000 will be spent in Saskatchewan and $1,000,000 in Regina. Noted Oct. 30, C. D.—Nov. 7, E. N.-R.

BIDS ASKED

Kan., Leavenworth—SWIMMING POOL and BATHHOUSE—See "Contracts Awarded."

†**Md., Annapolis**—DOLPHINS—May 27, by Yards & Docks, Navy Dpt., Wash., D. C., constructing dolphins, Spec. 8215.

Mass., Gloucester—PLAYGROUND DEVELOPMENT—See "Contracts Awarded."

Mass., South Boston (sta. Boston)—PLATFORMS—May 19, by Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, comr., 100 Nashua St., Boston. Contr. 2, P.W.A. Project 13-1-R, reconstructing timber and concrete platforms and wood and steel sheet pile protection at Head House of Commonwealth Pier No. 5. To exceed $100,000.

N. J., Newark—TRACK—May 21, by City Dpt. P. Affairs, City Hall, furnishing track for Sect. 1, City Railway under new Penn. Station partly underground and partly open cut. $50,000 plus.

N. Y., Buffalo—RECREATION CENTER—See "Contracts Awarded."

★**N. Y., Flushing**—FAIR—May 27, by Dpt. Parks, R. Moses, comr., Arsenal Bldg., Central Park, New York, grading Flushing Meadows Park site for George Washington Inaugural Fair, Queens Boro. Noted Sept. 27, C. D.—Oct. 3, E. N.-R.

N. Y., New York—SWIMMING POOL—See "Contracts Awarded."

N. C., Raleigh—DETENTION COLONY—See "Contracts Awarded."

O., Dayton — AIRPORT — See "Contracts Awarded."

Okla., Oklahoma City—GAS COMPRESSOR STATION—See "Contracts Awarded."

Okla., Oklahoma City—GAS and OIL DEVELOPMENT—See "Contracts Awarded."

Okla., Oklahoma City—GAS PIPE LINE—See "Contracts Awarded."

Okla., Oklahoma City—OIL PIPE LINE—See "Contracts Awarded."

Pa., Pittsburgh—HANGAR—May 21, by Bd. Comrs. Allegheny Co., J. J. Kane, chn., County Office Bldg., new hangar, relocation of U. S. Army hangar and new doors for auxiliary building, administration building, comfort station, concourse and ornamental wrought iron fence, at County Airport, Bethel Twp. P. H. Martin, County Office Bldg., Pittsburgh, and R. H. Hancock, County Airport, Pittsburgh, engrs.

†**Va., Yorktown** — BOILERS — May 20, by Yards & Docks, Navy Dpt., Wash., D. C., repairing boilers, Spec. 8209.

Ont., Wolfe Island—WHARF—May 19, by Secretary Dpt. P. Wks., Ottawa, constructing wharf and approach, involving 97,300 ft. B.M. timber in cribs, 51,150 ft. B.M. timber stringers, wheelguards, etc. 5,200 lin. ft. round timber, 2,000 cu.yd. stone fill in place, 2,550 lb. machine bolts and washers, 2,900 lb. drift bolts, 1,250 lb. wire spikes. $16,300. K. M. Cameron, Ot-

LOW BIDDERS

★†**T. H., Hickman Field**—HANGARS—Con. Q.M., Apr. 28, constructing 4 air corps hangars at Hickman Field, from A. W. Quist Co., Exch. Bldg., Seattle, Wash., $1,415,000. Noted Apr. 7, C. D.—Apr. 9, E. N.-R.

CONTRACTS AWARDED

Ind., Evansville—RIVERFRONT IMPROVEMENTS—Bd. P. Wks. and Bd. Park Comrs., City Hall, retaining wall on Riverside Dr., balustrade and stairway from street to wharf, concrete paving Riverside Dr. and wharf, excavating and riprapping Divs. 2, 3 and 4, for general improvement of city waterfront, to Western Constr. Co., 715 Citizens Bank Bldg.,

†*Federal Government*

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Unclassified (Continued)

Evansville, Pioneer Contg. Co., Upper Mount Vernon Rd., Evansville, and A. G. Ryan & Sons, Chrisney, $360,234; storm sewer in Bee Slough and extending Adams Ave. Sewer, Div. 5, to Northern States Impvt. Co., 312 Endicott Bldg., St. Paul, Minn., $94,207. **P.W.A.** Bids Apr. 27. Noted May 8, C. D.

Kan., Leavenworth—SWIMMING POOL and BATHHOUSE—City, rein.-con., brick swimming pool and bathhouse, owner builds, **W.P.A.** labor, $30,000. C. A. Haskins & Co., 517 Finance Bldg., Kansas City, Engrs.

†**Mass., Gloucester**—BOATHOUSE, etc.—U. S. Coast Guard Headquarters, Wash., D. C., general contract 1 story, 30x60 ft. boathouse and launchway at U. S. Coast Guard Station, to J. B. Rendle, 230 Meridian St., East Boston, $21,770. Est. $30,000. Bids Apr. 1. Noted Mar. 17, C. D.—Mar. 19, E. N.-R.

Mass., Gloucester—PLAYGROUND DEVELOPMENT—City, Park Dpt., City Hall, playground development, incl. 35x60 ft. concrete wading pool, rest house, tool shed of frame construction, volley ball court, baseball diamond, etc., day labor. Est. $26,000. Private plans by Park Dpt.

Mass., Turners Falls—AIRPORT IMPROVEMENT—Town of Montague, H. D. Bardwell, clk., Turners Falls, addition to airport, incl. grading, surfacing runways, etc. Owner soon starts work by day labor under **W.P.A.** Est. about $50,000. Noted June 17, C. D.—June 20, E. N.-R.

N. J., Newark — STATION FINISH — City, Dpt. Affairs, City Hall, furnishing, installing station finish for Sect. 1, City Railway under new Penn. Station for subway, Belleville Newark town line to new Penn. R.R. Station, to Meade Eng. Co., Inc., 217 West 14th St., New York, $94,020. Noted Apr. 16, C. D.—Apr. 23, E. N.-R.

N. J., Newark—SUBWAY ESCALATORS—City, Dpt. P. Affairs, City Hall, furnishing, installing escalators for Sect. 1, City Railway (subway), under new Penn. Station, partly underground and partly open cut, to Westinghouse Electric Elevator Co., 1500 North Branch St., Chicago, Ill., $65,722. Noted Apr. 15, C. D.—Apr. 23, E. N.-R.

N. Y., Auburn—STADIUM, etc.—Bd. Educ., City Hall, general contract constructing stadium and athletic field, to Ludke Bros. and Harrington Co., 33 Hackeborn Ave. Est. $91,087. **P.W.A.** General contractor awarded contract for reinforcing steel, to Bethlehem Steel Co., Bethlehem, Pa. Noted Mar. 23, C. D.—Mar. 5, E. N.-R.

N. Y., Buffalo—RECREATION CENTER—City, City Hall, constructing recreational center on Marine Pier at foot of South Michigan Ave., relief labor. To exceed $23,000.

N. Y., Flushing—STEEL SUPPORTS—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, constructing steel supports for storage track Steinway Tunnel line (Flushing Branch), to Bethlehem Steel Co., 25 Bway., New York, $60,805. **P.W.A.** Bids Mar. 31. Noted Apr. 1, C. D.—Mar. 19, E. N.-R.

N. Y., Medina—PARK—Village, Village Hall, improving Park Ave. Park, on Pine St., incl. grading, planting, baseball diamond, etc., relief labor. **W.P.A.** Owner will purchase materials.

★**N. Y., New York**—SWIMMING POOL, etc.—Dpt. Parks, Arsenal Bldg., Central Park, constructing 58x360 ft. swimming pool and bathhouse, Bradhurst Ave. and West 146th St., relief labor, $1,000,000. Owner will purchase materials. **W.P.A.** A. Embury, 2nd, c/o owner, engr. and archt.

N. Y., Syracuse—RADIO STATION TOWER—Central New York Broadcasting Co., Starrett Bldg., constructing steel tower for radio station, to J. D. Taylor Constr. Co., 119 South Salina St. Est. $45,000 incl. equipment. Owner will purchase broadcasting equipment. Plans in progress for transmitter room.

N. C., Raleigh—DETENTION COLONY—State Hy. and P. Wks. Comn., Raleigh, detention colony for 150 women on Prison Farm, near State Fair Grounds, by regular forces of State Hy. and P. Wks. Comn. To exceed $75,000.

O., Dayton — AIRPORT — City, constructing four 100 ft. wide runways, remodeling hangars, raising buildings, on Dixie Hy., incl. 160,000 cu.yd. excav., near here, relief labor. Est. $570,000. **W.P.A.** Noted Mar. 4, C. D.—Mar. 12, E. N.-R.

O., Wooster — GRANDSTAND — Wayne Co. Agricultural Society, structural steel, rein.-con. grandstand, 350 seating capacity, to Long & Bogner, Wooster. Est. $30,000. Osborn Eng. Co., 701 Euclid Ave., Cleveland, engrs. Noted Feb. 20, C. D.—Feb. 27, E. N.-R.

Okla., Oklahoma City—GAS and OIL DEVELOPMENT—The Roles Co., City Center Bldg., Wash., D. C., constructing gas and oil development, Edmond Oil fields, separate contracts and day labor. $50,000 or more. Private plans.

Oklahoma—GAS and OIL DEVELOPMENT—Geo. Pasquella, Perrine Bldg., Oklahoma City, gas and oil development in Seminole Co., separate contracts and day labor. To exceed $50,000.

Okla., Oklahoma City—GAS COMPRESSOR STATION—Black Gold Oil Co., Commerce Exchange, constructing 6 unit gas compressor station at northeast 30th and Lincoln ... company forces. $45,000. Private plans.

Okla., Oklahoma City—GAS PIPE LINE—Skelley Oil Co., Tulsa, constructing 9... 6 in. gas pipe line, own forces. $30,0... Lovell, Tulsa, engr.

Okla., Oklahoma City—OIL PIPE LINE—Empire Oil Co., Bartlesville, construct... lin.ft. 6 in. steel oil pipe line, ow... $27,000. J. Vogley, Bartlesville, eng...

Tenn., Nashville—TRACK LAYING ... "Materials and Equipment."

Wash., Vancouver—DOCK—G. H. ... Co., general contractors, Lewis Bldg., ... Ore., constructing plumbing and ... public dock, for Port of Vancouver, ... Rushlight, 407 Southeast Moreson Av... land, Ore.***electrical work, to Tice ... Co., 9325 Southeast 12th St., Portl... ***sprinkler system, to National ... Sprinkler, Portland, Ore.***miscellane... work, to Consolidated Ry. Equipment ... North Knott St., Portland, Ore.***roofi... metal, to R. F. Becker Co., Portland, ... piling, to Chapman Lumber Co., ... Bldg., Portland, Ore.***lumber, to DuB... ber Co., Vancouver***firtex, to Dant & ... Porter Bldg., Portland, Ore.***rolling ... doors, to McCracken Ripley, 221 North ... St., Portland, Ore.***mill work, to ... Planning Mills, Vancouver***paving, to ... bia Contg. Co., 44 Southeast Salmon St., ... land, Ore.***finish hardware, to ... Hardware Co., 805 Northwest Glisan St., ... land, Ore. Noted Apr. 15, C. D.—Apr. ... E. N.-R.

MATERIALS AND EQUIPMENT

PROPOSED WORK

ORNAMENTAL LIGHTS—**Pueblo, Colo.**—G. W. Clark, city clk., plans purchasing ornamental lights in a few weeks for 8 blocks downtown street.

ROAD ROLLER, etc.—**Auburn, Mass.**—Town, H. E. Sibley, chn. Bd. Selectmen, Town Hall, plans purchasing one 12 ton road roller and scarifier. $6,000.

PUMPING ENGINE TRUCK—**Ware, Mass.**—Town, O. Deslauriers, clk., Town Hall, plans purchasing pumping engine truck for Fire Dpt.

TANKS—**St. Louis, Mo.**—Apex Oil Co., 1218 Olive St., granted permit to install two 12,000 underground steel tanks for gasoline at 7300 South Bway.

STEEL TANK — **St. Louis, Mo.** — Firestone Tire & Rubber Co., 4232 Forest Park Blvd., granted permit to install one 1,000 gal. underground steel tank for gasoline for private use, 4232 Forest Park Blvd.

STEEL TANK—**St. Louis, Mo.**—Grennan Bakeries, Inc., 3908 Washington Ave., applied for permit to install 1,000 gal. underground steel tank for gasoline for private use at 3908 Washington Ave.

STEEL TANKS—**St. Louis, Mo.**—S. Simon, 2100 Market St., granted permit to install one 550 gal. and two 1,000 gal. underground steel tanks for gasoline for use in automobile service station, 2100 Market St.

STEEL TANKS—**St. Louis, Mo.**—B. Wides, c/o Monark Petroleum Corp., 5101 Manchester Ave., granted permits for installing 1,000 gal. underground steel tank, for private use at 1026 South 11th St. and also one 1,000 gal. underground steel tank, gasoline for private use at 2106 Salisbury St.

TRAFFIC SIGNAL LIGHTS—**Albany, N. Y.**—Bd. Contr., City Hall, soon takes bids purchasing traffic signal lights for street intersection in Northern Blvd. in front of Livingston Junior High School. $1,000.

GASOLINE TANK — **Binghamton, N. Y.**—Marine Midland Trust Co., 86 Court St., Binghamton, plans purchasing 1,000 gal. steel gasoline storage tank for gasoline service station, Kenwood Ave. and Exchange St. To exceed $1,000. R. W. Jewell, Upper Chenango St., engr.

STEAM PUMPS—**Binghamton, N. Y.**—C. A. Harrell will purchase 2 special steam pumps for flood protection for city waterworks, for City. $3,500. J. A. Giles, City Hall, engr.

STEEL STORAGE TANK—**Buffalo, N. Y.**—O'Rourke Baking Co., 812 East Ferry St., plans purchasing 1,000 gal. steel gasoline storage tank for service station at 1185 Jefferson Ave. To exceed $1,000. Pure Oil Co., Ellicott Sq. Bldg., lessee.

STORAGE TANK—**Buffalo, N. Y.**—Buffalo Cement Co., 2727 Main St., will purchase 500 or 1,000 gal. steel storage tank, for service station, 2729 Main St. To exceed $1,000.

TANK—**Buffalo, N. Y.**—Liberty Bank Building of Buffalo, Liberty Bank Bldg., plans purchasing 500-1,000 gal. steel tank for gasoline service station to be built at 2910 Main St. and Huntington Ave. To exceed $1,000.

FIRE FIGHTING EQUIPMENT — **Clayville, N. Y.**—Village, Village Hall, plans purchasing fire fighting equipment. $5,000. Noted May 29, 1935, C. D.—June 6, E. N.-R.

STEEL TANK—**Cortland, N. Y.**—Standard Oil Co. of New York, Genesee Bldg., Buffalo, plans purchasing 500 gal. or 1,000 gal. steel gasoline

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†*Federal Government*

Materials, etc. (Continued)

storage tank for service station to be built at Port Watson and Pendleton Sts. To exceed $1,000.

STORAGE TANK—**Elmira, N. Y.**—Standard Oil Co. of New York, Genesee Bldg., Buffalo, plans purchasing 1,000 gal. steel tank for service station, West Water and West Church Sts. To exceed $1,000.

STEEL TANKS — **Jamestown, N. Y.** — John Lindberg, 202 Superior St., plans installing two 500 gal. steel tanks, electric pump, air compressor at gasoline station to be established at portion of above address. $1,000.

STORAGE TANK—**Leroy, N. Y.**—Townsend & McVean, 15 Bank St., plans purchasing 1,000 gal. steel gasoline storage tank, pumps, equipment for gasoline service station, West Main Rd. To exceed $1,000. C. I. Cromwell, city engr.

STORAGE TANK—**Rochester, N. Y.**—Koetter & Fayre, Inc., 1086 North Clinton Ave., plans purchasing 1,000 gal. steel gasoline storage tank for service station at 1086 North Clinton Ave. To exceed $1,000.

GASOLINE STORAGE TANK — **Syracuse, N. Y.**—Standard Oil Co. of New York, Genesee Bldg., Buffalo, soon plans purchasing steel tank for gasoline storage, James and Edwards Sts. To exceed $1,000.

STEEL TANKS—**Utica, N. Y.**—Colonial-Beacon Oil Co., 26 Bway., New York, plans installing 550 gal. steel tanks, electric pump, air compressor, etc., in gasoline service station, Riverside Dr. and Coventry Ave. To exceed $1,000.

STORAGE TANK—**Waverly, N. Y.**—Standard Oil Co. of New York, Genesee Bldg., Buffalo, plans purchasing 1,000 gal. steel gasoline storage tank, for 106 Chemung St. To exceed $1,000.

STEEL TANKS—**Alliance, O.**—Liberty Oil Co. plans installing several 500 gal. steel tanks, electric pump, air compressor, etc., at gasoline service station. $1,000 or more.

TRUCKS, etc.—**Canton, O.**—City, Sewer Dpt. plans purchasing two trucks for Sewer Dpt.; 1,000 metal garbage cans. $1,100. M. Danhof, dir. P. Wks.

CONCRETE—**Cleveland, O.**—City, F. Milton, purch. agt., soon takes bids 2,500 cu.yd. ready mixed concrete. Legislation under way to purchase.

PAVING MATERIALS—**Cleveland, O.**—City plans purchasing 20,000 ft. expansion joint, 1,000 tons slag screenings, 10,000 tons asphalt sand, 10,000 tons binder stone, 200 tons bituminous crack filler, 2,000 sq.yd. granite block, 1,000 tons asphalt dust, 2,000 tons paving sand, 10,000 yd. Medina stone, 250 tons calcium chloride, 6,000 ft. sandstone curbing.

POLES, etc.—**Cleveland, O.**—City, F. Milton, purch. agt., plans purchasing light poles, cross arms, insulating pins and ground moulding (all of wood).

TRACTOR, etc.—**Cleveland, O.**—City, F. Milton, purch. agt., plans purchasing one tractor, line construction hardware, push brooms, broom fibre, lanterns, globes.

WIRE FENCE—**Cleveland, O.**—City, F. Milton, purch. agt., soon takes bids wire fence surrounding clear water basin at Division Ave. Filtration Plant. $8,000.

BOILER, PIPING and FOOTINGS—**Troy, O.**—City, G. Smith, dir. Pub. Serv., plans purchasing 640 hp. boiler, piping, footings, etc., for municipal electric plant. $72,000.

PUMPS — **Oklahoma City, Okla.** — Anderson Pritchard Oil Corp., W. R. Payne, supt., plans purchasing two 300 g.p.m. deep well pumps and motors.

PUMPS — **Oklahoma City, Okla.** — Phillips-Petroleum Co., A. H. Riney, ch. engr., plans purchasing five 300 g.p.m. deep well water pumps and motors.

PUMPS—**Oklahoma City, Okla.**—Sunray Oil Co., 1st Natl. Bldg., K. Garbin, supt., plans purchasing three 300 g.p.m. deep well water pumps and motors.

PUMPS, etc.—**Oklahoma City, Okla.**—City Water Dpt., will purchase six 300 g.p.m. deep well turbine pumps and motors for pumping cold water. T. G. Banks, engr.

DUMP TRUCK — **Penetanguishene, Ont.** — Town, W. H. Hewson, town clk., plans purchasing dump truck for road work. $2,500.

BIDS ASKED

SEWER PIPE, etc.—**Bayshore, Calif.**—Trustees of Bayshore Sanitary Dist., Votors Legion Hall, taking bids 1,800 lin.ft. 8 in., 1,760 lin.ft. 6 in., 600 lin.ft. 4 in. vitr. clay pipe with wye branches, bends, manholes, 7,000 common red brick, etc. G. A. Kneese, 2382 Broadway, Redwood City, engr.

†CEMENT—**Wash., D. C.**—May 29, by General Purchasing Officer, Panama Canal, furnishing Portland cement.

†DIPPER DREDGE—**Chicago, Ill.**—May 22, by U. S. Eng., 932 U. S. Post Office Bldg., Canal and Van Buren Sts., leasing and operating 1 dipper dredge and attendant plant with crew, for dredging in Illinois Waterway.

†WIRE ROPE—**Mondamin, Ia.**—May 19, by U. S. Eng., City Natl. Bank Bldg., Omaha, Neb., 500 ft. 6x19 in. wire rope, steel, uncoated fibre core, for Missouri River Work, f.o.b. Mondamin.

CAUSTIC LIME—**Baltimore, Md.**—May 20, by Bd. Awards, furnishing, delivering caustic lime to Bureau Water Supply.

†GASKETS, DRILLS, etc.—**Boston, Mass.**—May 19, by Bureau Supplies & Accounts, Navy Dpt., Boston, gaskets, drill, electric switches, copper tubing, X-ray, unit 1 May 22, for furnishing breast and rachet drills, hammers, drying tumbler, and nickel steel to Boston Navy Yard.

†BRONZE BUSHINGS — **Vicksburg, Miss.** — June 4, by U. S. Eng., 1,100 lb. bronze bushings.

†GENERATING SET—**Vicksburg, Miss.**—June 2, by U. S. Eng., steam engine driven marine type electric generating set, 110 volts, D.C. f.o.b. Vicksburg.

†PAINT—**Vicksburg, Miss.**—June 1, by U. S. Eng., 300 gal. black heat resisting smoke stack paint, f.o.b. Vicksburg.

†STEEL PLATES—**Vicksburg, Miss.**—June 1, by U. S. Eng., P. O. Box 667, Vicksburg, 76,678 lb. structural steel plates, sheared or universal mill, f.o.b. Vicksburg.

†ROUND WOOD PILES—**Omaha, Neb.**—May 20, by U. S. Eng., City Natl. Bank Bldg., 10,000 round wood piles for Missouri River work.

†WOOD PILES—**Omaha, Neb.**—May 20, by U. S. Eng., 810 Natl. Bank Bldg., Omaha, 10,000 round wood piles suitable for river improvement, 24-68 ft. long. $50,000.

†PUMP—**Concord, N. H.**—May 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing one 8-9 hp. 2 cylinder gasoline engine driven pump for tank service.

†WIRE, etc.—**Brooklyn, N. Y.**—June 5, by New York Signal Corps, Procurement Div., Army Base, 58th St. and 1st Ave., 990,000 ft. wire and 7,000 ft. cable.

CHLORINATING EQUIPMENT — **Honeoye Falls, N. Y.**—May 20, by J. J. Henner, purch. agt., Monroe Co., 104 Court House, Rochester, chlorinating equipment, equipment for heat digester, sludge pump, sewage flow measuring equipment, clarifier, sewage gas line equipment and miscellaneous equipment, for Village and Monroe Co. W. S. Lozier, Inc., 10 Gibbs St., Rochester, engrs.

STREET SIGN MATERIALS, etc.—**Canton, O.**—May 19, by Bd. Control, furnishing materials and equipment for replacement and repair street signs throughout city. $3,500.

DRILLING EQUIPMENT — **Oklahoma City, Okla.**—British American Oil Co., C. V. Sidwell, supt., 1st Natl. Bldg., in market for electric drilling equipment 300 kw. a.c. current for oil well.

OIL DRILLING EQUIPMENT — **Oklahoma City, Okla.**—Anderson Kerr Drilling Co., R. S. Kerr, pres., 1st Natl. Bldg., in market for electric oil drilling equipment, 300 kw. each, a.c. current.

PUMP—**Oklahoma City, Okla.**—Keyokle Oil Co., Key Bldg., in market for 250 g.p.m. deep well water pump and motor.

†ELECTRIC DRILLING EQUIPMENT—**Tulsa, Okla.**—Barnsdall Oil Corp., Purchasing Department, in market for electric drilling equipment 300 kw. alternating equipment.

CRUSHED STONE, etc.—**Wilkes-Barre, Pa.**—May 21, by B. F. Evans, secy. Luzerne County Poor Dist., 54 West Union St., furnishing crushed stone, road oil, tile flooring, c.i. pipe, 50 gal. stainless steel coffee urn, 150 steel lockers, lawn benches, paints, oils, chemicals, as required. To exceed $1,000. A. L. Reilly, 59 Bennett Bldg., engr.

BITUMINOUS PAVING MATERIALS—**Williamsport, Pa.**—City Council, bids about May 20, bituminous materials for street repairs. Est. $25,000. L. Mussina, city engr.

WIRE NAILS, etc.—**Texas**—Owner, c/o State W.P.A. Procurement Offices, Smith-Young Tower, San Antonio, taking bids supplying f.o.b. designated points 1,000 lb. wire nails, 1,500 lb. common wire nails, 1,000 lb. common nails, 100 pr. strap hinges, electric boxes, sockets, covers, receptacles, 14,100 lb. barbed wire, dipping vat materials, 500 bbl. portland cement, 100 rolls roofing, 1,127 fifteen ft. pieces reinforcing steel, 70,000 lin.ft. lumber various sizes, 70,000 tons asphalt, 30 septic tanks, drinking fountains, closets, thousand lb. dynamite and blasting powder.

†SAND, etc.—**Yakima, Wash.**—May 21, by Bureau Reclamation, Yakima, 76,000 tons sand and 124,000 tons gravel for construction work on Roza Division of Yakima Project; also 1,600 tons sand and 2,600 tons gravel for constructing Kachess Dam Spillway.

STONE, etc.—**Stephensville, Wis.**—May 20, by Town of Ellington, furnishing 2,000 cu.yd. crushed stone or gravel.

ASPHALT, etc.—**London, Ont.**—May 19, by City Clerk, supplying refined paving asphalt, road oil, Portland cement, limestone dust, iron castings, sewer pipe and land tile. W. M. Veitch, city engr.

†*Federal Government*

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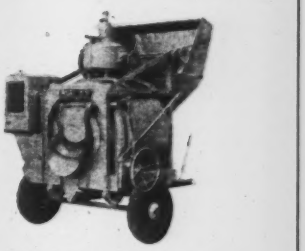
BEFORE YOU BUY— BEFORE YOU BID



SEE THE NEW 1936 MODEL

REX 10-S TRAILER MIXER WITH END DISCHARGE

Timken Bearing Equipped

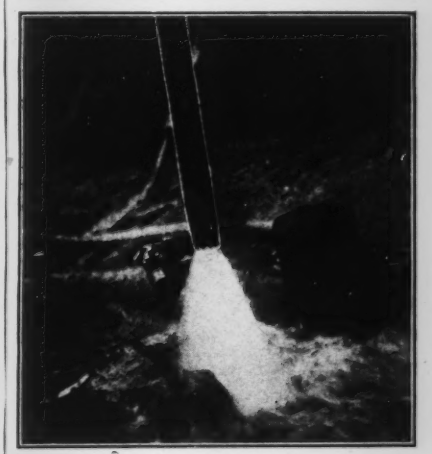
Pneumatic Tires—New Streamlines

Send for Bulletin No. 271 for Full Details

CHAIN BELT COMPANY

1633 W. Bruce Street, Milwaukee, Wis.

REX *Construction Equipment*



Duo-Valved—No water wasted in jetting and the steel toothed tip cuts hard material out of the way.

A contractor, who knew, wrote in—"Your points continued to produce results and did not clog during our operations." Note that word "clog"—its twin brother's name is Red Ink.

Moretrench Wellpoint Systems with Moretrench Pumps cost no more because it takes less units for the job. Contractors on 3000 jobs in nine countries can testify to this.

MORETRENCH CORPORATION

Works: Rockaway, N. J.

Sales Office: 90 West St., New York City

Materials, etc. (Continued)

PAINT—Toronto, Ont.—May 19, by Bd. Control, supply of first and second coat field paint. Call No. 35.

CONTRACTS AWARDED

ASPHALTIC CONCRETE WEARING SURFACE—**Alhambra, Calif.**—City Clerk, 3,900 tons asphaltic concrete base and 2,100 tons asphaltic concrete wearing surface, to Osborn Co., 1570 San Pasqual, Pasadena, $9,010. Bids Apr. 28, awarded Apr. 28. Noted Apr. 16, C.D.

CABLE—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., 10,000 ft. No. 2 AWG 7 strand, 3-conductor, rubber-insulated cable, Spec. 1920, to General Electric Supply Co., 385 East 2nd St., $6,720. Bids Apr. 23. Noted May 1, C. D.

CREOSOTE PILING, etc.—**Los Angeles, Calif.**—City Harbor Dpt., City Hall, 35,440 lin.ft. creosoted piling, bearing piles, 16 lb. treatment, D.F., only, to Pan Pacific Piling & Constr. Co., 2145 East 25th St., $20,137. Bids Apr. 22, awarded Apr. 29.

†EXPANSION JOINTS, etc. — **Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., 6,000 each rods mild steel, ¾ in. rod, 16 ft. long, threaded 1 in. each end and 38,000 each same, to Coost Eng. Co., 2060 Santa Fe Ave., $1,388. 2,600 machine bolts, to Payne Bolt Wks., 201 Main St., San Francisco, $301. Bids Apr. 28 Noted Apr. 24, C. D.

†POWER CRANES—**Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., power cranes, full Diesel crawler, full revolving 50 ft. boom, gross loads 5,100 lb. at 40 ft. 11 tons at 15 ft., at 75% of tipping load, Proposal 597, to Osgood Co., Marion O., $18,135. Bids Apr. 24.

†PUMP—**Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., furnishing 1 centrifugal type jetting pump. Proposals 595 and 596, to Crooke Co., 2900 Santa Fe Ave., $1,266. Bids Apr. 24. Noted Apr. 23, C. D.

POWER UNIT—**Los Angeles, Calif.**—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing 1 caterpillar D-13000 or equal, Diesel power unit, Spec. 1944, to Shepherd Tractor & Equipment Co., 150 West Jefferson St., $3,290. Bids Apr. 22, awarded Apr. 28.

†WIRE NAILS—**Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., furnishing common wire nails, Proposal 583, to P. E. Canfield Lumber Co., 135 Vista St., Pasadena, $2,597, f.o.b. Sterling, Ill., freight allowance $1.02 per cwt. Bids Apr. 20. Noted Apr. 28, C. D.

PUMP—**Porterville, Calif.**—F. M. Pfrimmer, city clk., 600 gal. pump on Type 38 American-La France fire engine, to American La France & Foamite Corp., 430 9th St., San Francisco, $2,000 plus sales tax. Noted Apr. 20, C. D.

†DITCH CLEANING MACHINE — **Denver, Colo.**—Bureau Reclamation, Denver, Colo., ditch cleaning and excavating machine, to Ruth Dredge Mfg. Corp., 5980 Boyle St., Los Angeles, Calif., $17,890.

SEWER PIPE—**Bridgeport, Conn.**—City P. Wks. Dpt., F. Toquet, city engr., furnishing 320 ft. 36 in. rein.-con. sewer pipe, to Clark Sewer Constr. Co., 631 Lindley St., $1,120. Bids Apr. 9.

BRIDGE LUMBER, etc. — **Algona, Ia.**—Kossuth Co., E. J. Butler, aud., 80,000 ft. B.M. bridge lumber, 2 carloads red cedar piling, to Wheeler Lumber, Bridge & Supply Co., Des Moines, $4,180***8,000 lin.ft. culvert pipe, to Iowa Culvert & Pipe Co., Des Moines, $1,786***2,200 lin.ft. corrugated metal pipe, to Iowa Culvert & Pipe Co., Mason City, about $1,786***2,000 lin.ft. concrete pipe, to Wilson Concrete Pipe Co., Humboldt, $1,220***80,000 ft. B.M. lumber, to Wheeler Lumber, Bridge & Supply Co., Des Moines, $3,428. Grand total $12,400. For 2 carloads red cedar piling, to Wheeler Lumber, Bridge & Supply Co., Des Moines, at 33c. per ft.

GASOLINE, OIL, PIPE, etc.—**Sac City, Ia.**—Sac Co., W. Gilbert, aud., gasoline, oil and grease, to Quality Oil Co., Early, $577***concrete pipe, to Lake View Concrete Pipe Co., Lake View, $3,803***lumber, to Nebraska Bridge Supply & Lumber Co., Omaha, Neb., $5,416. Grand total $9,796. Diesel fuel, to Shell Petroleum Co., Early. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

CULVERT PIPE—**Sibley, Ia.**—Osceola Co., F. W. Folkers, aud., 1,848 lin.ft. entrance culvert pipe, and 2,200 lin.ft. roadway culvert pipe, to Sibley Cement Co., Sibley, $1,120 and $3,550 respectively. Noted Apr. 17, C. D.

PIPE FITTINGS—**Baltimore, Md.**—City, Bd. Awards, Municipal Bldg., furnishing, delivering brass service pipe fittings to Bureau Water Supply, to A. P. Smith Co., 545 North Arlington Ave., East Orange, N. J., $9,956. Bids Apr. 22. Noted Apr. 29, C.D.

FIRE HYDRANTS—**Fall River, Mass.**,—City, City Auditor, City Hall, T. J. Logan, comr. P. Wks., 50 hydrants, to Chapman Valve Mfg. Co., 71 A St., South Boston, $75 each. Bids Apr. 20, awarded May 1. Noted Apr. 17, C. D.

TRUCK, etc.—**Rochester, Minn.**—Olmsted Co., one 1½ ton truck, to Clements Chevrolet Co., Rochester, $1,154***bituminous surface material, to Industrial Materials Co., Commerce Bldg., St. Paul, road oil 4.73c. per gal., cut back asphalt 5.89c., total $4,962. Noted Apr. 23, C.D.

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PATROL GRADERS—**St. Peter, Minn.**—Nicollet Co., two motor patrol graders, to Austin Western Rd. Mchy. Co., 2328 Territorial Rd., St. Paul, $4,734. Bids Apr. 9.

†STEEL—**Fort Peck, Mont.**—U. S. Eng., Kansas City, Mo., 7,500 tons steel for tunnel in connection with Fort Peck Tunnel, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill.

†CABLE—**Boulder City, Nev.**—Bureau Reclamation, Denver, Colo., furnishing 6,850 lin.ft. 5,000 volt varnished-cambric-insulated cable, 420,000 lin.ft. 5,000, 1,000 and 600 volt rubber-insulated cable, 3,150 lin.ft. special insulated cable and 14,000 lin.ft. rubber and asbestos insulated cable for installation in Boulder Power Plant, Boulder Canyon Project, Arizona, California, Nevada, f.o.b. Boulder City, to Simplex Wire & Cable Co., 79 Sidney St., Boston, Mass., $111,208. Bids Jan. 31.

SAND and ASPHALTIC OIL, etc.—**Trenton, N. J.**—Bd. Freeholders Mercer Co., Court House, 3,000 tons sand, to D. Moser, 168 Hamilton Ave., $2,355; 128,000 gal. asphaltic oil and tar, to Barrett Paving Co., 28 West State St., $10,373. Noted Apr. 27, C. D.—May 7, E. N.-R.

CRUSHED STONE—**Albany, N. Y.**—Dpt. P. Wks., Albany, 1,200 tons crushed stone, delivery to Hy. 8325, Delaware Co., near Downsville, to Catskill Mountain Corp., 47 Mamaroneck Ave., White Plains, $2.05 per ton***1,000 tons, delivery Leicester, Livingston Co., to General Crushed Stone Co., 506 Cutler Bldg., Rochester, $2,223***660 tons, delivery to Hy. 1039, between Baldwinsville and Cicero, Onondaga Co., to Solvay Sales Corp., Box 271, Syracuse, $1.90 per ton***900 tons, delivery to Hy. 8428, in Hamilton Co., to J. Walker, Mayfield, $2.65 per ton***650 tons, delivery to Hys. 338, 483, 1004, 1431, near Ithaca, in Tompkins Co., to Warlock Stone Co., Canastota, $2.50 per ton.

FIRE APPARATUS—**Utica, N. Y.**—Bd. Contr. & Supply, G. P. Hodges, secy., City Hall, one 400 series V-12, 1,500 gal. pump and hose car, with booster tank, one V-12 75 ft. double banked aerial tank for Fire Dpt., to American La France & Foamite Industries, Inc., Elmira. Est. $30,000.

ALUMINUM VEHICLE, etc.—**Raleigh, N. C.**—Division Purchase & Contract, A. S. Brower, dir., furnishing 5,000 gal. aluminum vehicle in 1 gal. cans, to Geo. D. Wetherill & Co., Inc., 113 Arch St., Phila., Pa., $3,700***880 drums lubricant, Grades A, B and C, to Sinclair Refining Co., 630 5th Ave., New York, $1,788*** 800 road machine and drag blades, to Job. P. Wyatt & Sons Co., 325 South Wilmington St., $1,660***38 dozen rock and sledge hammers, to Tidewater Supply Co., Asheville, $552*** 98,600 lb. structural steel, plates, anchor bolts, etc. and 40,700 lb. structural steel, to Dietrich Bros. Inc., 133½ South Salisbury St., $2,994 and $1,297 respectively***40,684 bd. ft. creosoted timber, to Taylor Colquitt Co., Spartanburg, S. C., $3,139***pipe and bands, f.o.b. Lenoir and f.o.b. Boone, to Wheeling-Corrugating Co., 9th and Perry Sts., Richmond, Va., $1,975 ***pipe and bands, f.o.b. West Jefferson, to Va. Metal Mfg. Co., Inc., Roanoke, Va., $1,516 ***2,183 drag blades and 1,500 road machine blades, to Pullman Standard Car & Mfg. Co., Webb-Crawford Bldg., Birmingham, Ala., $2,183 and $2,710 respectively***150,800 lb. structural steel, f.o.b. Camp Polk, to Virginia Bridge Co., Roanoke, Va., $5,930****15,215 bd.ft. creosoted timber, to Georgia Creosoting Co., Brunswick, Ga., $1,113***34,880 lb. structural steel, f.o.b. Seaforth, to Carolina Steel & Iron Co., Greensboro, $1,189. Grand total $31,747. Division Purchase & Contract, A. S. Brower, dir., furnishing 300 chassis, 191 in. wheel base and 50 chassis, 157 in. wheel base, to Sanders Motor Co., 329 South Blount St., $550.02 and $525.69 each respectively; 50 chassis 157 in., to Chevrolet Motor Co., 110 West Hargett St., at $514.80 each. Bids Apr. 23. Noted Apr. 17 and 22 C. D.

CULVERT PIPE—**Raleigh, N. C.**—Div. Purchase & Contr., A. S. Brower, dir., furnishing pure Armco iron 99.9% pure iron, or Toncan Molybdenum iron, galvanized corrugated metal culvert pipe and bands, to Virginia Metal Mfg. Co., Inc., Roanoke, Va., $2,593***to the Newport Culvert Co., Inc., Newport, Ky., $1,242 ***to J. B. Hunt & Sons, Odd Fellows Bldg., $4,455***to Dixie Culvert & Metal Co., 801 Fayetteville St., $14,547***to Wheeling-Corrugating Co., 9th and Perry Sts., Richmond, Va., $9,261. Grand total $32,098. Bids Apr. 29.

GRADER—**Jamestown, N. D.**—Stutsman Co., one elevating grader, to Dakota Tractor & Equipment Co., Fargo, $7,225.

TRUCKS — **Milbank, S. D.** — Grant Co., 2 trucks, to Milbank Motors, Milbank, $1,700.

BITUMINOUS MATERIAL — **Pennsylvania** — Commonwealth of Pennsylvania, Harrisburg, furnishing 900 tons bituminous material, to M. O'Herron, 48 South 18th St., Pittsburgh, $4,805***100 tons, to Burrell Constr. & Supply Co., New Kensington, $554***663 tons, to Pittsburgh Asphalt Prod. Co., 1101 Western Ave., Pittsburgh, $3,847***100 tons, to Interstate Amiesite Co., Phila., $560. Grand total $9,766. Bids Mar. 20.

BITUMINOUS MATERIAL — **Pennsylvania** — Commonwealth of Pennsylvania, Harrisburg, furnishing 350 tons bituminous material, to Interstate Amiesite Corp., Phila., $2,002***80 tons, to LeRoy Colprovia Pave. Co., $299*** 550 tons, to Amiesite Corp., Elverson Bldg., Phila., $3,164***350 tons, to J. and M. Doyle Co., 1429 Federal St., Phila., $2,192. Grand total $7,657. Bids Mar. 18.

BITUMINOUS MATERIAL — **Pennsylvania** — Commonwealth of Pennsylvania, Harrisburg, furnishing 820 tons bituminous material, to Quaker Sales Co., Johnstown, $4,257***200 tons, to Amiesite Corp., Elverson Bldg., Phila., $1,518***340 tons, to Interstate Amiesite Co., Phila., $1,760. Grand total $7,535. Bids Mar. 18.

†ELECTRICAL CONDUCTOR — **Knoxville, Tenn.**—Tennessee Valley Authority, Knoxville, 1,008,000 ft. electrical conductor for Widows Guntersville Line, to Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa., $150,297.

STEEL RAILS, etc.—**Nashville, Tenn.**—Nashville Chattanooga & St. Louis R.R., C. F. Blackie, ch. engr., about 5,000 tons steel rail and track fastenings, etc., to Tennessee Coal & Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala., $165,000. Owner will lay track by day labor and separate contracts.

★ †CEMENT — **Texas** — Bureau Reclamation, Denver, Colo., 20,000 bbl. standard cement in bulk, 5,000 bbl. standard cement in sacks, 290,000 bbl. modified or standard cement in bulk for Hamilton and Arnold Dams, Colorado River Project, to Republic Portland Cement Co., Smith-Young Tower, San Antonio, $835,000.

STEEL RAILS — **Richmond, Va.** — Southern Ry. Co., Richmond, furnishing 3,700 tons steel rails, to Tennessee Coal & Iron R.R. Co., Brown-Marx Bldg., Birmingham, Ala.

PIPE, etc.—**Camas, Wash.**—City Water Dept., City Hall, 2,722 ft. 14 in. dipped steel pipe and fittings, to Federal Pipe & Tank Co., 5442 24th St. N.W., Seattle, $4,000.

GRADER—**La Crosse, Wis.**—La Crosse Co., grader, to Cunningham-Ortmayer Co., 429 West Michigan Ave., Milwaukee, $2,350. Bids Apr. 24.

†PIPE and FITTINGS, etc.—**Milwaukee, Wis.**—National Park Service, Milwaukee, pipe and fittings, to Glamorgan Pipe & Fdry. Co., 122 South Michigan Ave., Chicago, Ill., $1,680; lead, to Hy. Schiffman Co., 1428 West Pierce St., $132. Bids Apr. 22, awarded Apr. 28.

CRUSHING PLANT, etc.—**Portage, Wis.**—Portage Co. Hy. Comrs., furnishing crushing plant and crusher, to Wisconsin Fdry. & Mch. Co., 623 East Main St., Madison, $7,000; bituminous distributor, tank car heater and boosters, to T. W. Rosholt Co., Wausau, $7,375. Noted Apr. 24, C. D.

TRUCKS—**Wauwatosa, Wis.**—Park Bd. furnishing trucks, to Holmes Motor Co., 1001 North Jefferson St., Wilwaukee, $1,771. Bids Apr. 27, awarded May 4.

CRANE—**Nanaimo, B. C.**—Dpt. P. Wks., Ottawa, Ont., supplying 6 ton electric travelling crane, to Dominion Bridge Co. Ltd., Lachine Que., $23,300.

BITUMINOUS MATERIAL—**Cornwall, Ont.**—United Counties of Stormant, Dundas, and Glengarry, materials for roads will be purchased as required from the firms that tendered, names not made public. Est. $128,200. Noted Mar. 27, C.D.—Apr. 2, E.N.-R.

GRAVEL—**Ellice Twp., Ont.**—Ellice Twp., c/o F. Faurme, supt., R.R. 5, Stratford, finding, crushing and hauling gravel, to William Yundt, 122 St. Vincent St., Stratford, and Alex Hartung, R.R. 1, Gladshill, at 84c. per yd.

FOREIGN

England — C. H. Adcock, clk. Rural District Council, 15 Market Pl., **Boston**, taking bids supplying and laying 176 mi. watermain, incl. spun iron pipe trunk lines in part asbestos-cement pressure pipe distribution lines together with all auxiliary works, V. C. C. Durard, engr. ***May 22, by H. A. Hield, clk., **Torquay**, constructing 638 ft. reservoir, 63 ft. high and road diversion of 1¼ mi., E. Sandeman, 15 Victoria St., Westminster S.W. London, engr.*** June 2, by Sutton Dwellings Trust, Victoria House, Southampton Row, London, constructing 275 houses and 60 flats at St. Budeaux Estate **Plymouth**, $750,000, Barron & Rooke, 1 Sussex Terrace, Pitmans Square, Plymouth, archts.

England — Folkstone Municipality voted $1,000,000 for constructing bathing pool and seafront improvements***Bournemouth** Municipality voted $510,000 for construction of solarium and sports centre***Ilfrancombe** Municipality votes $600,000 for constructing bathing pool and orchestral hall***Southend** Municipality votes $1,200,000 for constructing esplanade from Chalkwell to Leigh and reclaiming 53 acres of foreshore***Brighton** Municipality votes $200,000 for constructing open air bathing pool, $60,000 for car park, $1,500,000 for reconstructing seafront and $2,000,000 for new town hall***Liverpool** Municipality extending clearance Dock station, incl. concrete chimney, to Joshua Henshaw & Sons, Ltd., Liverpool, $128,970; 2 water tube boilers, to Babcock & Wilcox Ltd., $745,000; 50,000 kw. turbo generator set, to Metropolitan Vickers Electrical Co., Ltd., 894,220***May 29, by G. F. Stringer, clk. Metropolitan Water Bd., 173 Rosenbery Ave., **London**, supplying and erecting 8 water tube boilers, superheaters, economisers, preheaters, mechanical stokers, fans, piping, etc., for Hampton Station.

England, London—Chinese Purchasing Comn., c/o Fox & Mayor, 155 Dashwood House, Old Broad St. E.C., taking bids supplying one 5 ton overhead traveling crane, hand operated

†Federal Government

Foreign (Continued)

and for 2 kw. alternator, low voltage, a/c generator and 10 kw. d/c generator.

France, Paris—Compagnie Centrale Rousselot, 50 Rue Boileau, in market for carbonate of magnesium.

Ireland, River Suir—Allied Iron Wks. Ltd., West Bromwich, England, plans plant, $500,000.

Mexico, Mexico City—Government and Dutch Interests, made arrangements for about $22,216,000 loan to construct 800 kilometers (495 mi.) railroad linking Tabasco, Chiapas and Yucatan.

New Zealand, Wellington—July 3, by Director General Stores Div., General Post Office, supplying 500 buzzers-trembler, 500 receivers-bell, 432 switches-tumbler 5 ampere, slow break and 144 switches-tumbler 5 ampere slow break, 2 way, both with wooden mounting block; 10,000 taps, 1,000 sleaves fibre, black for plug, 5,000 nacks 5 point and 24 bridging coils.

Scotland, Glasgow—Edmiston & Mitchels, 31 St. Vincent Pl., interested in prices of Douglas fir, clear spruce, western red cedar and white pine. Cant & Kempt, 52 Saint Enoch Square, interested in prices of white pine.

Siberia, Baikal—Soviet Government, Moscow, or c/o Amtorg Trading Corp., 265 5th Ave., New York, plans dam on Angara River and hydro-electric project with 3,600,000 kilowatt hrs. annual capacity. Private plans.

South Africa, Johannesburg—Church-Wardens of Roman Catholic Cathedral, making plans constructing cathedral, incl. 275 ft. spire and stainless metal cross 25 ft. high, $650,000.

Wales, Swansea—May 26, by H. Lang Coath, town clk., supplying and placement of 3,681 ft. 12- to 24-in. stone sewer, and 7,130 ft. 9- to 48-in. c.i. pipe; constructing tunnel under tidal river with shafts built in c.i. segments under compressed air to accommodate 18 in. c.i. and steel pipe, inverted syphon sewer, 582 ft. 6 in. lined tunnel, 69 ft. depth of 6 ft. lined shaft, and 78 ft. depth of 9 ft. 9 in. c.i. lined shaft; culvert reconstruction comprising of 9 ft. 9 in. c.i. lined culvert with internal lining concrete and having brick invert, 1,197 ft. 8 in. rein.-con. culvert with brick invert, and 8 in. width, rectangular culvert, 171 ft. long; constructing 3 rein.-con. pumping stations; all incidental works of alterations to existing works. J. R. Health, Guildhall, Swansea, engr.

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Sacramento—Sacramento School Dist., plans by H. Devine, Cronan Bldg., fine and applied arts building, Freeport Blvd. $200,000.

Conn., Bristol — City, K. A. Reiche, supt. Schools, plans by H. A. Hayden, 175 Main St., 2 story, basement, brick, steel school, 10th Dist., Chippens Hill. $140,000.

Conn., Hartford—City, T. F. Foley, Hartford Works Progress Administrator, plans brick, steel addition to Hartford Isolation Hospital, 2 Holcomb St. Est. $150,000. W.P.A. project. Architect not appointed.

Conn., Hartford—City, Park Dpt., G. C. Long, Jr., pres., sketches by R. Barker, 17 Staple Pl., West Hartford, brick, stone recreation building, Colt Park. $150,000.

★ **Fla., Orlando**—M. R. Watkins, dir. State Constr. Activities, Tallahassee, has announced that Orlando has been selected as the location for new tuberculosis sanatorium, $600,000. Financed by federal funds.

Idaho, Moscow—University of Idaho, c/o M. G. Neale, pres., plans 4 story men's dormitory, $250,000. Architect not appointed.

★ **†Md., Fort Meade**—Con. Q. M., Fort Meade, plans constructing barracks, schools, garages and magazines, $950,000. **Maturity this fall.**

†Me., Togus—Vet. Administration Construction Service, Arlington Bldg., Wash., D. C., rejected bids Apr. 21, constructing barracks and recreational building at Veterans Hospital. Noted Apr. 24, C. D.—Mar. 19, E. N.-R.

†Mass., Gardiner—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids Feb. 10, constructing 2 story, basement, 91x96 ft. post office, City Hall Ave. $128,000. Will readvertise. Noted Feb. 17, C. D.—Jan. 23, E. N.-R.

Mich., Ann Arbor—University of Michigan Union, Ann Arbor, plans to be completed for 4 story, basement, L-shaped, brick, steel, rein.-con. addition to union building, plain found., State St. $300,000.

★ **†Missouri**—Federal Resettlement Administration, Wash., D. C., plans resettlement development on 4,600 acre tract in St. Louis Co., in district between Hys. 77 and 89, Old Hall's Ferry Rd. and Lindbergh Blvd., to house 1,000 families. Ultimate plans will provide for 2,500 families. Options have been acquired on necessary ground. $7,000,000. **Maturity soon.**

★ **†Mo., Jefferson Barracks**—U. S. War Dpt., c/o Contr. Q.M., plans rein.-con., brick barracks, $240,000; mess hall and kitchen addition to barracks' buildings, $60,000; officers' quarters, $143,000; nurses' home, $43,300; telephone system, $6,000, on Army Reservation, total $492,300. **Maturity late 1936.**

Mo., Jefferson City—Missouri State Penitentiary, Jefferson City, and Bi-Partisan Advisory Bd. State Building Comm., E. M. Eagan, executive secy., rejected bids Mar. 24, constructing women's penitentiary group. Est. about $336,000. Will readvertise. P.W.A. project. Klipstein & Rathman, 316 North 8th St., St. Louis, archts. Noted Apr. 2, C. D.—Mar. 5, E. N.-R.

★ **Mo., Jefferson City**—State Penitentiary, Jefferson City, plans completed by Gentry Voskamp & Neville, Inc., 4 West 13th St., Kansas City, and soon takes bids constructing two 1 story, brick, stone industrial units, $200,000; 2 story, stone, rein.-con. garage, $50,000; 3 story, basement, 75x320 ft., brick, stone, steel kitchen and laundry building, $350,000. P.W.A. project. C. A. Haskins, 517 Finance Bldg., Kansas City, superv. engr.

★ **Mo., St. Louis**—Bd. P. Service, City Hall, plans by A. Osburg, City Hall, bids in June or July, constructing foundations for Malcom A. Bliss Psycopathic Institute of City Hospital, 7 story, brick, stone on block bounded by Park Ave., Carroll, Dillon and Grettan Sts. $1,500,000, incl. equipment. P.W.A. project. W. C. E. Becker, city engr.

Mo., Sikeston—Sikeston School Dist. 54, Scott Co., R. E. Bailey, secy. Bd. Educ., soon takes bids constructing 2 story, 57x118 ft. elementary school. Bids Apr. 24 rejected. W. B. Ittner, Inc., 408 Bd. of Educ. Bldg., 911 Locust St., St. Louis, archts. P.W.A. project. Noted Apr. 15, C. D.

★ **Neb., Omaha**—University of Omaha plans school, several buildings, $500,000. Architect not appointed. Arranging for finances now, inspection of various sites being made, present site too small for new construction.

†N. H., Peterboro—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids Jan. 13, 1 story, basement, 59x62 ft., U. S. Post Office, Grove St. Will readvertise. Noted Jan. 15, C. D.—Jan. 9, E. N.-R.

N. Y., Buffalo—Bd. Educ., City Hall, plans school to replace School 18, School St. near West Ave. To exceed $140,000. Architect and engineer not appointed.

N. Y., Eastchester—Village plans either converting Wilmont School into town hall or constructing new village hall. Architect and engineer not appointed. Est. about $140,000.

N. Y., East Syracuse—Bd. Educ. Union Free School Dist. 5, plans by Randall & Vedder, S. A. & K. Bldg., rebuilding East Hermann St. School. Est. about $150,000. Noted Apr. 24, C. D.—Apr. 30, E. N.-R.

N. Y., Rensselaer—City plans enlarging local high school by addition to present structure. $150,000. **Maturity later.**

N. Y., Theresa—Union Free School Dist. 1, bids after May 11, constructing school. $163,685. D. K. Sargent, 212 Harrison St., Syracuse, archt. Noted Apr. 7, C. D.—Apr. 9, E. N.-R.

N. Y., Solvay—New York State Fair Industrial Exhibit Authority, H. B. Brewster, Dillage Bldg., withdrew bids to have been opened May 7, constructing horticultural building at State Fair. A. L. Brockway, Clinton Sq. Bldg., Syracuse, archt. Noted Apr. 27, C. D.—Apr. 30, E. N.-R.

†N. C., Biltmore—Pisgah National Forest, J. H. Stone, forest supervisor, Asheville, plans 2 story warehouse $10,000; 3 shops $18,300; garage $5,000; and 8 rearing pools $6,000, at West Chapel and London Rds. Total exceeds $40,000. P. L. Gaston, Ashville, engr.

★ **N. C., Charlotte** — Mecklenburg Co. Bd. Educ., R. E. McDowell, chn. Bd. Educ., Route 3, Charlotte, E. L. Best, supt. Schools, plans bond election for rural schools. $593,300.

N. C., Lenoir—Caldwell Co. Bd. Educ., W. C. Taylor, chn. Bd., Collettsville, and C. M. Abernathy, Lenoir, supt. Schools, filed application with P.W.A. for funds to finance construction of schools. $180,000.

N. C., Newton—Catawba Co. Bd. Educ., C. Clapp, chn. Bd., Newton, and J. A. Capps, Newton, supt. Schools, filed application with P.W.A. for funds to finance construction of new schools. $143,427.

N. C., Shelby—City, H. Woodson, mayor, filed application with P.W.A. for loan and grant to finance construction electric light power plant. $225,000.

N. C., Smithfield—Johnston Co. Bd. Educ., W. H. Call, Selma, chn. Bd., and H. B. Marrow, Smithfield, supt. Schools, filed application with P.W.A. for funds to finance construction of schools. $252,900.

N. C., Winston Salem—City plans large hospital on West End School Grounds. To exceed $400,000. W. N. Reynolds has contributed $200,000. Duke Foundation $125,000 and other subscriptions.

O., Cleveland—Bd. Co. Comrs. Cuyahoga Co., J. F. Gorman, chn., Court House, plans 3 story, basement brick, child welfare building East 22nd St. and Central Ave. $300,000. Architect not appointed.

O., Troy—City plans by R. T. Parrish, 127 Cambridge Ave., Dayton, 2 story, basement, rein.-con., stone municipal building, incl. offices, police department headquarters, public library, plain found. $150,000.

Pa., Girard—Borough, Ethel Davis, clk., plans municipal light plant. $140,000. Borough approved $55,000 bond issue as Borough's share for construction. Noted Apr. 13, C. D.—Apr. 16, E. N.-R.

Pa., Latrobe—Bd. Educ., Court House, Greensburg, C. P. Maxwell, county supt. Schools, Dr. S. W. Nealon, pres. Bd. Educ., plans by C. H.

†*Federal Government*

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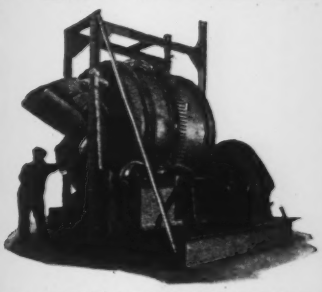
Ransome

BIG MIXERS



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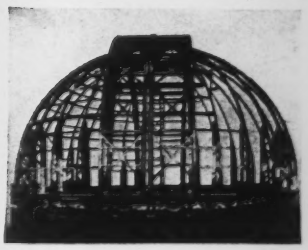

This is the steel framework for the new Princeton University Observatory Dome, J. W. Fecker, Consulting Engineer, which we recently fabricated and erected. It is offered as an example of our ability to handle intricate steel construction where extreme accuracy is a prime requisite.

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Public Buildings (Continued)

Sorber, 501 1st National Bank Bldg., Greensburg, 3 story, basement, 100x250 ft., brick, tile, steel high school addition, incl. gymnasium, $175,000. Noted July 11, C. D.—July 18, E. N.-R.

Pa., Milton—Bd. Educ. abandoned project for erection of 10 room addition to local high school, 4 rooms to elementary school and installing new heating plant in third school. No bids received Apr. 30, for same, second time bids were asked. Board recalled $80,000 bond issue to finance its part of project. Total est. $150,000.

Pa., Ruffs Dale—Bd. Educ., J. K. Albig, secy., sketches by C. C. Compton, 4th Ave. and Thompson St., Donora, brick, tile, probably bar joist floor and roof construction of high school, incl. auditorium and gymnasium, South Huntington Twp. $150,000.

R. I., Howard (Cranston)—State, Emergency P. Wks. Comn., State Office Bldg., Providence, plans completed by Jenks & Ballou, 2600 Industrial Trust Bldg., Providence, and soon takes bids pending on P.W.A. approval, brick, steel power plant at State Hospital. $125,000.

†**Tex., Panola**—Resettlement Administration, c/o S. P. Trent, regional dir., Marshall, bids in June, constructing two hundred fifteen 3 and 5 room buildings, vicinity of here, for Federal Resettlement Project. Procurement Div. Officer, San Antonio, will purchase materials.

Wis., Delavan—State Bd. Control, Madison, plans by A. Peabody, state archt., Madison, 2 story, basement, 112x142 ft., brick, reinforced, State School for Deaf, plain found.

Wyo., Torrington—Town Bd., c/o J. L. Knowlton, city clk., appropriated $25,000 for improving municipal light and power plant.

Alaska, Seward — Town, A. D. Balderston, clk., constructing municipal power plant, incl. 2,263 ft. tunnel, dam, 5,180 ft. pipeline, power house with either two 375 kva. or one 500 kva. hydro-electric units, operator's cottage, small warehouse and garage, 500 ft. road with 20 ft. bridge, power house with step-up transformers, 11 mi. transmission line step-down substation, distribution system, $140,000. Hubbell & Waller Eng. Corp., Alaska Bldg., Seattle, Wash., engrs. P.W.A. project. Noted Mar. 20, C. D.—Mar. 26, E. N.-R.

N. S., Kentville—Dr. W. S. Blair, chn. Hospital Comn., plans 35 bed hospital. $200,000.

Ont., London—London Victoria Hispital Trust plans by O. Roy Moore & Co., 489 Richmond St., 3 story, basement, 50 x 116 ft. cancer clinic building, Colborne St. $165,000. Noted Mar. 31, C. D.—Apr. 9, E. N.-R.

BIDS ASKED

†**Ala., Fort Payne**—June 1, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $60,000.

★ †**Ariz., Whipple** — Veterans Administration, Arlington Bldg., Wash., D. C., bids about June 1, remodeling U. S. Veterans Hospital. $676,000. Noted Feb. 5, C. D.—Feb. 13, E. N.-R.

†**Ark., Ft. Smith**—June 16, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office and Court House. $375,000.

†**Calif., San Francisco**—June 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., vault protection, etc., at U. S. Mint.

†**Calif., Watsonville**—June 12, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $135,000.

†**Conn., Norwalk**—June 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, Cross, Wall and Belden Sts. $340,000. Noted Feb. 13, C. D.—Feb. 20, E. N.-R.

†**D. C., Wash.**—June 5, by Treas. Dpt. at office Sup. Archt., Wash., D. C., motion picture film vault equipment in Archives Building.

†**Fla., West Palm Beach**—June 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $272,000.

†**Ga., Atlanta**—May 29, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing detention cells in U. S. Post Office and Court House.

Ind., Anderson—May 19, by Bd. P. Wks., City Hall, 1,200 hp. boiler, fuel burning equipment for light plant improvements. Private plans.

†**Ind., Batesville**—June 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**Ia., Leon**—June 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $62,000.

†**Ky., Lexington**—June 8, by P. Wks. Administration, Housing Div., Interior Bldg., Wash., D. C., constructing superstructure Blue Grass Park and Aspendale Housing Project. Noted Dec. 17, C. D.—Dec. 26, E. N. R. under "Contracts Awarded."

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†**La. Haynesville**—June 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**Mass., Natick**—May 29, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $92,000. Noted Mar. 3, C. D.—Mar. 5, E. N.-R.

Mich., Battle Creek—May 18, by A. B. Chanel, archt., 9 Merwood Dr., 2 story, basement, brick, steel, stone, rein.-con. library addition to Willard Library. $150,000. P.W.A. project. Noted Jan. 9, C. D.—Jan. 9, E. N.-R.

Minn., Madison—May 25, by City, furnishing, installing new boiler with auxiliary equipment in municipal power plant. To exceed $25,000 (not official). Perkins & McWayne, 322 Paulton Blk., Sioux Falls, S. D., engr.

Mo., Farmington—June 2, by State Hospital 4, Farmington, and Bi-Partisan Advisory Bd. State Building Comn., E. M. Eagan, executive secy., Jefferson City, altering and constructing dining hall addition, Johnson & Mack, Chemical Bldg., St. Louis, archt.; five 2 story, basement, brick cottages, $375,000. T. P. Barnett Co., Bonsack & Pearce, Inc., Dreisoerner & Leech, E. T. Friton and O. J. Krieg, 1559-64 Arcade Bldg., St. Louis archts., all above work at State Hospital. P.W.A. project.

Mo., Fulton—May 29, by State Hospital 1, and Bi-Partisan Advisory Bd. of State Building Comn., E. M. Eagan, executive secy., Jefferson City, constructing 28x40 ft. and 82x140 ft., rein.-con., brick, steel power plant. P.W.A. project. Baumes-McDevitt Co., Railway Exchange Bldg., St. Louis, and R. Toensfeldt, Security Bldg., St. Louis, engrs. Noted Apr. 20, C. D.—Apr. 23, E. N.-R.

Mo., Mexico—May 20, by School Dist. 59 of Audrain Co., J. Barclay, secy. Bd. Educ., 2 story, basement, Garfield School, concrete, brick, and remodeling existing McMillian School. O. W. Stiegemeyer, 4817 Oleatha St., St. Louis, archt. P. W. A. project.

★ **Mo., Mount Vernon**—May 26, by Missouri State Sanitorium, Mount Vernon, and Bi-Partisan Advisory Bd. of State Building Comn., E. M. Eazan, executive secy., Jefferson City, 4 story, basement, rein.-con., brick, stone administration and medical center and infirmary buildings. $500,000. P.W.A. project. Hoit, Price & Barnes, Telephone Bldg., Kansas City, archt. Noted Apr. 20, C. D.—Apr. 23, E. N.-R.

Mo., Waynesville—See "Contracts Awarded."

†**Mont., Malta**—See "Contracts Awarded."

†**N. J., Madison**—June 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $89,000. Noted Jan. 10, 1933, C. D.—Jan. 12, 1933, E. N.-R.

†**N. M., Portales**—June 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $83,000.

N. Y., Brooklyn—May 18, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. Ext. and Concord St., mechanical equipment, plumbing and drainage, heating and ventilating apparatus, electrical work and lighting fixtures for new P. S. 239, on north side of Neptune Ave., between West 24th and West 26th Sts., for Bd. Educ., 500 Park Ave., New York.

†**N. Y., East Rochester**—June 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $70,000. Noted Feb. 24, C. D.—Feb. 27, E. N.-R.

★ **N. Y., Newburgh**—June 9, by Bd. Educ., general contract, plumbing, heating, electrical work for school. $1,215,000. Bids Apr. 22 rejected. Knappe & Morris, 192 Lexington Ave., New York, archts., revising plans. Noted May 1, C. D.—Apr. 2, E. N.-R.

†**N. Y., New York**—May 18 (extended date), by P. Wks. Administration, Housing Div., Interior Bldg., Wash., D. C., constructing superstructure of Harlem River Houses, Project H-1302. Noted Apr. 9, C. D.—Apr. 16, E. N.-R.

N. Y., New York—May 18, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. Ext. and Concord St., Brooklyn, mechanical equipment, plumbing and drainage, heating and ventilating apparatus, electrical work, Item 1; and lighting fixtures, Item 2, for new P. S. 113, on easterly side of Barnes Ave., between 216th St. and 217th St., Bronx Boro, for Bd. Educ., 500 Park Ave., New York.

N. Y., New York—May 21, by Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., New York, general contract, plumbing, heating, refrigeration, electrical work and altering boiler plant and additions, and refrigerating plant at Metropolitan Hospital, Welfare Island. $172,500. P.W.A.

†**N. Y., New York**—May 25, by Treas. Dpt. at office Sup. Archt., Wash., D. C., additions and alterations (protective work) at U. S. Assay Office.

†**N. Y., Northport**—June 16, by Veterans Administration, Arlington Bldg., Wash., D. C., constructing and finishing complete additional buildings and facilities at U. S. Veterans Administration Facility.

N. Y., Ogdensburg—May 19 (extended date) by Bd. Educ., F. Elie, chn., Building Committee, general contract, plumbing, heating, electrical work for trade school building. $170,400. P.W.A. project. Randall & Vedder, S. A. & K. Bldg., Syracuse, archts. Noted May 1, C. D.—May 7, E. N.-R.

†**N. Y., West Point**—June 3, by Col. [illegible] M., Military Academy, constructing 60 sets quarters.

N. Y., Windham—Central School Dist[illegible] ing bids general contract, plumbing, [illegible] electrical work for school. $275,000. [illegible] project. J. Russell White, 19 State St., [illegible] archt. Noted Mar. 30, C. D.—Apr. 2, E. N.-R.

Pa., Phila.—May 20, at office A. B. [illegible]son, secy. and bus. mgr. Bd. Public Edu[illegible] St. at Parkway, new Junior High School [illegible] Master, 24th and Seybert Sts., incl. [illegible] work (except demolitions and found[illegible] metal lockers, hardware, plumbing, heati[illegible] and ventilating, electrical and elevator work.

†**S. C., Charleston**—May 26, by Dpt. A[illegible] ture, Div. Purchase, Sales & Traffic, [illegible] D. C., erecting 5 buildings, 3 of whi[illegible] frame buildings, 1 a combination gree[illegible] and headhouse, incl. central heating plan[illegible] rein.-con. laboratory building, at U. S. R[illegible] Vegetable Breeding Laboratory. $30,000.

†**S. C., Greenville**—May 22, by Treas. D[illegible] at office Sup. Archt., Wash., D. C., constr[illegible] elevator in U. S. Post Office.

†**S. C., Sumter**—June 9, by Treas. Dp[illegible] at office Sup. Archt., Wash., D. C., constru[illegible] U. S. Post Office. $115,000.

†**Tex., Eastland**—June 4, by Treas. Dp[illegible] at office Sup. Archt., Wash., D. C., constru[illegible] U. S. Post Office. $74,000.

†**Tex., Midland**—June 2, by Treas. Dp[illegible] at office Sup. Archt., Wash., D. C., constru[illegible] U. S. Post Office. $88,000.

Va., Blacksburg—May 19, by Virginia P[illegible] technic Institute, of Virginia, constru[illegible] student activities building, P.W.A. proj[illegible] Carneal, Johnston & Wright, Richmond, [illegible] Noted Mar. 13, C. D.

†**Va., Leesville**—June 5, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

†**W. Va., Richwood**—May 29, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $67,000.

†**Wis., Elkhorn**—June 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $65,000.

Wis., Pewaukee—May 23, by Joint School Dist. 1, H. S. Washburn clk., altering and constructing 2 story, basement 63 x 83 ft. and 1 story part basement, 94 x 114 ft., brick, steel gymnasium and grade school addition, plans found. $146,000. H. J. Van Ryn, 152 W. Wisconsin Ave., Milwaukee, archt. Noted Dec. 19, C. D.—Dec. 26, E. N.-R.

†**Wis., Rice Lake**—June 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $75,000.

†**C. Z., Summit**—June 24, by Yards & Docks, Navy Dpt., Wash., D. C., constructing facilities building, Spec. 7890. Noted May 4, C. D.—May 7, E. N.-R.

†**T. H., Oahu**—Yards & Docks, Navy Dpt., Wash., D. C., taking bids constructing building at Naval Radio Station, Lualualei, Spec. 7891. (Date not set.)

CONTRACTS AWARDED

★ **Calif., Pasadena**—Bd. Educ., 320 East Walnut St., for Horace Mann Building, 2 story, basement, rein.-con., structural steel, incl. auditorium, 70 classrooms, library, offices, rest rooms, etc., at Pasadena Junior College, to H. Mayson, 9315 Hooper Ave., Los Angeles, $588,845. Noted Apr. 17, C. D.

Calif., Sacramento—Azevedo Constr. Co., general contractors, 920 "O" St., painting for offices South N St., to D. Zelinsky & Sons, 165 Grove St., for State***steel forms and reinforcing steel, to Soule Steel Co., 1750 Army St.*** steel sash, to Michel & Pfeffer Iron Wks., 10th and Harrison Sts.***architectural terra cotta to Gladding, McBean Co., 660 Market St.*** ornamental iron work, to California Artistic Metal & Wire Co., 349 7th St.***kalamein doors, pressed metal frames, hollow metal steel doors, to Forderer Cornice Wks., 269 Potrero Ave.***hollow metal fire doors, to Truscon Steel Co., Atlas Bldg., all foregoing contractors in San Francisco***hollow tile and brick, to Cannon Co., North Sacramento***wood, block floors, to Forsberg & Frise, 1865 49th St.*** sheet metal, to M. R. Carpenter, 907 Front St. ***millwork, to Capital City Planing Mill, 1812 9th St.***steel deck and joists, to Palm Iron Wks., P. O. Box 746***concrete, to Sacramento Rock & Sand Co., 16th and A Sts., all foregoing contractors in Sacramento. Noted Apr. 7, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

Calif., Sacramento—Barrett & Hilp, general contractors, 918 Harrison St., San Francisco, sheet metal for 4 story, rein.-con. motor vehicle building, to F. Z. Ahl, 2114 P St., for State ***miscellaneous iron, to A. J. Bayer, P. O. Box 2176, Arcade Station, Los Angeles***roofing, to A. L. Burr, 2714 28th St., Sacramento. Noted May 4, C. D.—May 7, E. N.-R., under "Contracts Awarded."

Calif., Salina—Barrett & Hilp, general contractors, 918 Harrison St., San Francisco, plumbing and heating for court house, for Monterey Co., to J. A. Nelson, 1375 Howard St., San

†*Federal Government*

Public Buildings (Continued)

Francisco. Noted Apr. 3, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

Conn., Milford—Town, H. M. Merwin, first selectman, Town Hall, superstructure brick-steel town hall addition for court and police facilities, to J. Zandonella, East Thorne St., Bridgeport, $75,000. **P.W.A.** Bids Apr. 22. Noted May 1, C. D.—**Apr. 2, E. N.-R.**

Conn., Torrington—F. Buzzi & Sons, general contractors, 586 South Main St., steel erecting and structural steel and iron, for city hall, to Connecticut Steel Erecting Co., 1043 State St., New Haven, for City, City Clerk, City Hall*** electrical work, to D. M. Laraia, South Main St.***reinforcing steel, to Bethlehem Steel Co., 8th St. and Lehigh St., Bethlehem, Pa.***roofing, to Marquards Wall Paper & Paint Shop, 20 Water St.***elevators, to Eastern Machinery Co., 250 Asylum St., New Haven. Noted Apr. 24, C. D.—Apr. 30, E. N.-R., under "Contracts Awarded."

†D. C., Wash.—Treas. Dpt. at office Sup. Archt., Wash., D. C., altering 5th Floor U. S. Treasury to Peterson Co., 6634 Eastern Ave. N.W. $62,000.

D. C., Wash.—District Comrs., District Bldg., Wash., D. C., constructing additions to Anacostia Junior-Senior High School, to Harwood-Nebel Constr. Co., 2539 Pennsylvania Ave., $347,942. Bids Apr. 23. Noted Apr. 28, C. D.—Apr. 16, E. N.-R.

Me., Brunswick—Town, E. W. Booker, clk., 1st Natl. Bank Bldg., 2 story, basement, 106x201 ft., two 32x38 ft. wings, brick, stone, steel and granite Senior High School, incl. heating, plumbing, electrical work, Spring and McKeen Sts., to D'Amore Constr. Co., 89 State St., Boston, Mass., $224,587. **P.W.A.** Bids Mar. 10, awarded May 5. Noted Mar. 17, C. D.—Aug. 15, E. N.-R.

Md., Silver Spring—Bd. Educ. Montgomery Co., Court House, Rockville, 2 story, basement addition to Junior High School on Brookville Rd. near North Silver Spring, to T. Calvin Owens, Bethesda, $113,225. Est. $120,000. **P.W.A.** Bids Apr. 24.

Mass., Lee—E. W. Larkin Co., general contractors, 1242 Main St., Springfield, roofing for high school addition, to E. H. Friedrich Co., 73 Sargeant St., Holyoke, for Town, J. J. Bossidy, chn. Building Comm.***stone, to Vermont Marble Co., 44 School St., Boston***marble, to Heltonville Limestone Co., Bedford, Inc.***steel, erecting and structural steel, to Haarman Steel Co., Dacharme Ext., Holyoke***reinforcing steel, to Bethlehem Steel Co., 62 Main St., Springfield ***iron, to Stafford Iron Wks., Inc., 135 Stafford St., Worcester***finish, to Caspar Ranzer Lumber Co., 6 Newton St., Holyoke***excavating, waterproofing, dampproofing by general contractors. Noted Apr. 7, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

Mass., Lowell—Lowell General Hospital, 339 Varnum Ave., 3 story, basement, 65x123 ft., brick, steel, stone, granite hospital addition, Varnum Ave., to Aberthaw Co., 80 Federal St., Boston. Est. $140,000. Bids Apr. 16, awarded May 1. Noted Apr. 13, C. D.—Apr. 9, E. N.-R.

Mass., North Grafton — Commonwealth of Massachusetts, Dpt. Mental Diseases, Dr. W. Overholser, comr., State House, Boston, furnishing 2 pressure oil burners at Grafton State Hospital, to De Walt Sales Co., 27 Sargent St., Worcester, $2,563. Bids Apr. 29, awarded May 1. Noted Apr. 23, C. D.—Feb. 20, E. N.-R.

Minn., Minneapolis—Bd. Educ., 305 City Hall, G. F. Womrath, asst. supt., in charge of Buildings, piling foundations only for 2 story, basement school, 50th and Dupont Aves., N., to Standard Constr. Co., 215 South 6th St., $21,460. Noted Apr. 16, C. D.

†Mont., Malta—Rural Resettlement Administration, Wash., D. C., sketches constructing thirty-three 4 and 5 room farm houses, 33 barns, 6 mi. road, 15 mi. electric power lines, drilling 33 wells for resettlement project, day labor, $200,000. W. R. Plum, Malta, resident engr.

Mo., Kansas City—Bd. Educ., sprinkler system for Kansas City Junior College, 11th and Locust Sts., to Automatic Sprinkler Co. of America, Maryland Bldg., Kansas City, $14,250.

†Mo., Kennett—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Hiram Lloyd Building & Constr. Co., 1608 Syndicate Trust Bldg., St. Louis, $49,165. Bids Apr. 24. Noted Apr. 28, C. D.—Apr. 2, E. N.-R.

Mo., Overland—C. H. Schroeder Building & Constr. Co., general contractors, 2806 North Grand Blvd., St. Louis, excavating for 1 story, part basement, brick, grade school for Ritenour Consolidated School Dist., H. F. Buder, pres., to Krummel & Jansen, 5978 Southwest St., St. Louis***steel erection, to Zeis Erection Co., 4918 Lansdown St., St. Louis***sheet metal and heating, to J. Broddon Sheet Metal Wks., 4559 Page St., St. Louis***millwork, to North St. Louis Planing Mill Co., 3616 Carter St., St. Louis***plastering, to H. Niehaus Plastering Co., Loudermann Bldg., St. Louis***lathing, to Hessing Constr. Co., Louderman Bldg., St. Louis***glazing, to Pittsburgh Plate Glass Co., 3900 Chouteau St., St. Louis***roofing, to Insulating & Materials Co., 3460 South Bway., St. Louis***painting, to C. Raftery Painting Co., 722 Bayard St., St. Louis***electrical work, to Mack Electric Co., 4581 Gravois St., St. Louis ***plumbing, to E. Gallagher, 4102 Marharetta St., St. Louis. **P.W.A.** Noted Feb. 14, C. D.—Feb. 20, E. N.-R., under "Contracts Awarded."

Mo., St. Louis—Bd. P. Service, City Hall, furnishing, installing air conditioning system in city hall, to Eichler Heating Co., 2125 Locust St., $7,577. Bids Apr. 28. **P.W.A.** Noted Apr. 21, C. D.—Apr. 23, E. N.-R.

†Mont., Missoula—Treas. Dpt. at office Sup. Archt., Wash., D. C., installing 1 passenger elevator and 1 dumbwaiter in U. S. Post Office, to Otis Elevator Co., 810 18th St., Wash., D. C., $13,800. Bids Mar. 6. Noted Feb. 17, C. D.—Feb. 20, E. N.-R.

Mo., Waynesville — Waynesville Consolidated School Dist. 6, E. E. Cox, pres., constructing 2 story, 126 x 154 ft., rein.-con., brick high and grade school, incl. auditorium and gymnasium, by **W.P.A.** labor, M. Johnson, engr. in charge, Johnson & Mack, Chemical Bldg., St. Louis, archts.

†Neb., Seward—Ernest Rokahr & Sons, general contractors, 1815 Y St., Lincoln, plumbing, heating and electrical work for 2 story, basement, brick post office for Treas. Dpt. at office Sup. Archt., Wash., D. C., to Nelson Electric Co., Seward***painting, to W. Thomas, Seward ***roofing and sheet metal work, to Krause Cornice & Roofing Co., 212 South 9th St., Lincoln***glass, to Western Glass & Paint Co., 211 South 11th St., Lincoln***marble and tile, to Sunderland Bros., 609 North 46th St., Omaha. Noted Jan. 3, C. D.—Jan. 9, E. N.-R.

N. J., Jersey City—City, City Hall, excavation for hospital, to J. Mitchell, Inc., West Side Ave., about $3,120. **P.W.A.** Noted Dec 3, C. D.—Dec. 5, E. N.-R.

Daily News

The news in these pages has been reported daily during the past week by first class and air mail to subscibers to McGraw-Hill *Construction Daily*. Sample copies on request. $10 per month, $1 added for air mail. Order daily service through Business News Department, *Engineering News-Record*, 330 W. 42nd St., New York, N. Y.

N. Y., Eggertsville—B. Rébescher & Sons, general contractors, 110 Timon St., Buffalo, cast stone for school for Union Free School Dist. 13, to Cast Stone Co., Morgan Bldg., Buffalo ***painting, to John B. Barnes, 63 Woeppel St., Buffalo***metal lathing and plastering, to F. Seitz, 45 Avery Pl., Cheektowago***glass and glazing, to Pittsburgh Plate Glass Co., 101 Seneca St., Buffalo. **P.W.A.** Noted Mar. 5, C. D.—Mar. 12, E. N.-R., under "Contracts Awarded."

N. Y., Holland Patent—Central Rural School Dist. 1, general contract, exclusive foundations, school on Thompson Rd., to T. C. Brown Co., Inc., 307 Union St., Schenectady. **P.W.A.** Noted Apr. 23, C. D.—Apr. 30, E. N.-R.

N. Y., Holland Point—T. C. Brown, Inc., general contractors, 307 Union St., structural steel for school, to Utica Structural Steel Co., Dwyer Ave., Utica, for Bd. Educ., Central School Dist. **P.W.A.** Noted May 6, C. D.—May 14, E. N.-R. under "Contracts Awarded."

N. Y., Jefferson — Central School Dist. 1, plumbing for school, to G. E. Flower, Hobart ***heating, to J. Hunter Heating & Contg. Co., 68 Liberty St., Albany***electrical work, to E. G. May, 51 Central Ave., Albany. **P.W.A.** Bids Apr. 21. Noted Apr. 28, C. D.—Apr. 16, E. N.-R.

N. Y., Keeseville—Central School Dist. 1 general contract 2 story, basement, 150x200 ft. school, to West Bros., Rouses Point, $280,000. **P.W.A.** Bids Apr. 22. Noted May 4, C. D.—Apr. 23, E. N.-R.

N. Y., Kenmore—J. W. Cowper Co., general contractors, Rand Bldg., Buffalo, cut stone for town and village municipal building for Town of Tonawanda and Village of Kenmore, to Loomis Stone & Marble Co., 1776 Elmwood Ave., Buffalo. **P.W.A.** Noted Mar. 30, C. D.—Apr. 2, E. N.-R., under "Contracts Awarded."

N. Y., Montgomery—Bd. Educ., general contract school, to J. Bisceglia & Sons, 231 Harrison Ave., Harrison, $155,500. Subject to **P.W.A.** approval. Noted Mar. 4, C. D.—Apr. 23, E. N.-R.

†N. Y., Mount Vernon—Treas. Dpt. at office Sup. Archt., Wash., D. C., completing extension and remodeling U. S. Post Office, to Arc Eng. Corp., 739 2nd Ave., New York, $92,675. Bids Mar. 20. Noted Mar. 24, C. D.—Mar. 12, E. N.-R.

N. Y., New York—Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., general contract altering laundry at Gouverneur Hospital, to M. L. White, 621 Broadway, $4,080 plus $48*** laundry machinery, steam fitting, ventilating, plumbing, electrical work, to U. S. Hoffman Machinery, 105 4th Ave., $30,125. **P.W.A.** Bids Mar. 16, C. D. Noted Mar. 10, C. D.—Mar. 12, E. N.-R.

N. Y., New York—Dpt. Hospitals, S. S. Goldwater, comr., 125 Worth St., New York, electrical work for erecting and completing of superstructure of Pavilions C and D, Bellevue Hospital, to Watson Flagg Eng. Co., 140 Cedar St., $197,797. **P.W.A.** Bids Mar. 19. Noted Mar. 19, C. D.—Mar. 12, E. N.-R.

N. Y., Perry—Union Free School Dist. 6, general contract constructing school, to W. B. Harders, 28 Bissell Dr., Eggertsville***plumbing, to C. Grimm, 259 Delaware Ave., Buffalo, N. Y.***heating, to R. J. Moran, 379 East Utica St., Buffalo***electrical work, to Cooperative Electric Co., Perry. Subject to **P.W.A.** approval. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

N. Y., Rome—Zingerline Bros., general contractors, 224 West Front St., structural steel for police and fire alarm signal plant, to Smith & Caffrey Co., 2611 Lodi St., Syracuse, for City, A. C. Tedd, mayor. **P.W.A.** Noted Jan. 10, C. D.—Jan. 16, E. N.-R., under "Contracts Awarded."

N. Y., Rome—Bevan Constr. Co., general contractors, 3566 East Genesee St., tile and marble for hospital at Floyd Ave., for Bd. Mgrs. Oneida Co. Hospital, to Stearns Sons & Dennin, 1112 East Fayette St., Syracuse*** elevators, to Warsaw Elevator Co., 425 Midland Ave., Syracuse***cast stone, to Onondaga Litholite Co., 102 North Beech St., Syracuse*** ornamental iron, to Syracuse Stair & Iron Wks., 717 Burnet Ave., Syracuse. **P.W.A.** Noted Apr. 2, C. D.—Apr. 9, E. N.-R., under "Contracts Awarded."

N. Y., Rushford—Central School Dist. 1, general contract constructing school, to R. E. Williams & Sons Co., Inc., 303 Grote St., Buffalo ***plumbing and heating, to Jamestown Plumbing & Heating Co., 120 Cherry St., Jamestown ***electrical work, to Gabler Electric Co., 116 South 4th St., Olean. Est. $160,000. **P.W.A.** Noted Apr. 23, C. D.—Apr. 30, E. N.-R.

N. Y., Schenectady—W. F. Hendrick Co., general contractors, 1547 Northland Ave., Lakewood, O., cast stone for armory for Dpt. Military & Naval Affairs, Capitol Bldg., Albany, to Onondaga Litholite Co., 102 North Beech St., Syracuse***piling, to Western Concrete Pile Corp., 52 Vanderbilt Ave., New York***miscellaneous iron, to Ornamental Steel Co., Inc., 860 Seneca St., Buffalo***structural steel, to Belmont Iron Wks., 44 Whitehall St., New York. Noted Mar. 3, C. D.—Mar. 5, E. N.-R., under "Contracts Awarded."

N. Y., Walkill—Dpt. Correction, State Office Bldg., general contract dairy buildings, at Walkill Prison, to C. J. Seaton, Haverstraw*** plumbing, to Warsfield & Havermale, Inc., Main St., Nyack***electrical work, to Fischback & Moore, Inc., 444 Bway., Albany. Noted Apr. 21, C. D.—Apr. 9, E. N.-R.

North Carolina—State Hy. and P. Wks. Comn., Raleigh, W. L. Craven, bridge engr., plumbing and pipe lines at Scotland County Prison Camp, 3 mi. north of Laurinburg, to Minor Plumbing Co., Fayetteville, $3,547*** plumbing at Pitt County Prison Camp, 5 mi. south of Greenville, to Hickory Plumbing & Heating Co., Hickory, $2,913***electrical work at Scotland Co. and at Pitt Co. Prison Camps, to Mill & Marine Co., Gastonia, $2,435 and $1,645 respectively. Grand total $10,540. Bids Apr. 28.

†Okla., Enid—P. Wks. Administration, Div. Housing, Wash., D. C., foundations for Cherokee Terrace Housing Project, Project H-5401, to D. C. Bass & Sons Constr. Co., Enid, $28,310. Bids Apr. 14. Noted Apr. 16, C. D.—Mar. 26, E. N.-R.

†Okla., Fort Sill—Con. Q.M., Fort Sill, new boilers, 5 draft regulators, steam lines and altering post hospital building, to Warner B. Ewer Co., 400 Madison St., Chicago, Ill., $53,950. Awarded May 1.

R. I., Burrillville—Pelletier Constr. Co., general contractors, 173 Bailey St., Woonsocket, structural steel for warehouse, garage, ice plant, incinerator at Wallum Lake Sanatorium, to J. H. Tower Iron Wks., 50 Borden St., Providence, for State Emergency P. Wks. Comn., 365 State Office Bldg., Providence***roofing and sheet metal, to Providence Cornice Co., 309 Canal St., Providence***paint, to Thomas C. Mee, 28 Arnold St., Woonsocket***elevators, to Otis Elevator Co., 124 Franklin St., Providence*** cast stone, to Durastone Co., Inc., Saylesville ***granite, to J. Capaldi, Providence. Noted Feb. 13, C. D.—Feb. 20, E. N.-R., under "Contracts Awarded."

R. I., Howard—Cruise Constr. Co., 19 Dexter St., Pawtucket, reinforcing steel for auditorium and chapel at mental hospital, to Truscon Steel Co., 7 Weybosset St., Providence, for State Emergency P. Wks. Comn., State House, Providence***structural steel, to J. H. Tower Iron Wks., 50 Borden St., Providence***roofing, sheet metal and waterproofing, to Farber Co., 47 Division St., Pawtucket***plaster, to Harry Carr & Son, 75 Westminster St., Providence***paint, to H. Newton Marshall, 524 Harrison Ave., Boston, Mass.***marble, tile floors, to Capitol Marble & Tile Co., 48 Oxford St., Providence***cast stone to A. Thomson, Allens Ave., Providence. Noted Dec. 16, C. D.—Dec. 19, E. N.-R., under "Contracts Awarded."

Tex., San Antonio—Bd. Educ., c/o R. S. Menefee, pres., building units public school, to

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†*Federal Government*

Public Buildings (Continued)

care for overflow buildings at 3 locations, brick, walls rein.-con. frames, etc., to C. L. Browning, Milam Bldg., J. Banspach, 252 West Josephine St., and V. Prassel, San Antonio. $126,083. **P.W.A.** Awarded May 1. Phelps & De Wees, Gunter Bldg., archts.

Tex., Wichita Falls — Wichita Falls Junior College, c/o C. H. Clark, pres., heating and plumbing for Junior College, to C. Hughes, Wichita Falls, about $16,400. **P.W.A.** Noted Apr. 20, C. D.—Apr. 23, E. N.-R., under "Contracts Awarded."

Wis., Antigo — Bd. Educ., general contract addition to vocational school, to Maas Bros., Watertown, $104,560. **P.W.A.** Law, Law & Potter, Madison, archt. Noted Dec. 26, C. D.—Jan. 2, E. N.-R.

COMMERCIAL BUILDINGS

PROPOSED WORK

Ariz., Clarkdale—United Verde Copper Co., plans by S. C. Lee, 1648 Wilshire Blvd., Los Angeles, Calif., air conditioning in theatre building, $10,000.

Calif., San Francisco—Owner, c/o S. A. Colton, 544 Market St., archt., making plans 4 story, rein.-con. 33 apartment house, $150,000.

Calif., Trona—American Potash & Chemical Corp., 609 South Grand Ave., Los Angeles, plans by L. L. Dorr, 906 Architects Bldg., Los Angeles, group of 60 one story frame dormitory buildings and dwellings to be built here, $300,000.

Calif., West Los Angeles—Twentieth Century-Fox Film Corp., 10260 Orton Ave., making plans 135x212 ft. new sound stage, composition roofing, steel frame, steel roof trusses, sound deadening sheet metal work, automatic storage water heater, etc., 10260 Orton Ave. $350,000. J.A. Barlow, 10260 Orton Ave., engr.

Calif., Woodland — National Theatre Syndicate, 25 Taylor St., San Francisco, sketches by S. C. Lee, 25 Taylor St., San Francisco, rebuilding rein.-con. theatre, destroyed by fire. $150,000.

Conn., Bridgeport — H. Koerner, archt., 50 Bartram Ave., soon lets contract 61x112 ft. church, East Main and Pearl Sts., for Holy Ghost Russian Orthodox Parish, c/o A. Veniaminoff, pastor, 1520 East Main St. Noted May 6, C. D.—**June 13, E. N.-R.**

Conn., New Haven — Westville Realty Co., Bailey & Bailey, 152 Temple St., plans by J. Weinstein, 341 State St., 1 and 2 story, brick, steel theatre and store, Whalley Ave., Westville Sect. $140,000.

★ **Ill., Alton**—Methodist Episcopal Bd. of Hospitals, c/o Dr. C. L. Peterson, Lebanon, plans by LaBeaume & Klein, 315 North 7th St., St. Louis, Mo., rein.-con., brick, stone 75 bed hospital complete with all modern equipment. Est. about $500,000. Noted Feb. 10, C. D.—Feb. 13, E. N.-R.

Ill., Mattoon—Mattoon Theatre Co., c/o E. F. Clarke, 1421 Bway., soon lets contract 1 story, 50x140 ft., rein.-con., brick theatre and store building, modern sound picture equipment, air-conditioning, etc. B. F. Barnes, 4948 Lotus Ave., St. Louis, Mo., and R. A. M. Anderson, Chicago, Ill., archts.

Me., Bangor—Eastern Maine General Hospital, 489 State St., plans by Crowell & Lancaster, 6 State St., hospital addition, $250,000. C. E. Neegaard, 512 5th Ave., New York, consult. archt.

Mass., Woburn—F. W. Woolworth Co., Woolworth Bldg., New York, plans altering and repairing fire damaged storage, store and office, 397 Main St. $100,000. Architect not appointed.

Mich., Detroit—St. Johns Episcopal Church, Woodward Ave. and Vernor Hy., plans by O'Dell & Roland, 904 Marquette Bldg., 2 story, brick, rein.-con., steel church alterations and additions, plain found., Woodward Ave. and Vernor Hy. Est. $150,000.

Mich., Detroit—Salem Lutheran Church, c/o Merrill & Cole, archts., 1111 Collingwood Ave., 2 story, basement, 65x120 ft., brick, steel, stone church, plain found., Forest St. and Iroquois Ave. $150,000.

★ **Minn., Minneapolis**—Group comprising store owners, real estate dealers holding leases and mortgage companies holding liens in Nicollet Ave. between 3rd and 5th Sts., c/o Lieberberg & Kaplan, archts., 710 McKnight Bldg., making sketches constructing new store fronts on all buildings in area, 5 in. granite base course, refacing walls. $500,000.

Mo., Salem—Lyric Theater Co. plans by B. F. Barnes, 4948 Lotus Ave., St. Louis, and takes bids about May 15, 2 story, part basement, 70x112 ft., rein.-con., brick theater, shop and office building.

Mo., St. Louis—City, c/o B. L. Brown, pres. Bd. P. Serv., 304 City Hall, plans by A. Osburg, 301 City Hall, 2 story, basement, rein.-con., brick, stone negro community center, incl. gymnasium and auditorium, Glasgow Ave. between Dayton and Gamble Sts. Will purchase 236½x300x110 ft. site. $150,000-$175,000. P.W.A. project. Appropriation bill approved by Bd. P. Serv. Wm. C. E. Becker, 301 City Hall, engr.

N. J., Bergenfield—T. Moffa, 344 East 144th St. New York, plans group 100 dwellings, Ruby Garden, To exceed $200,000.

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N. J., Jersey City—G. O. K. Circuit plans new theatre, 174 Newark Ave. $200,000 plus. Private plans.

N. J., Teaneck—Henry Levine & Co., c/o F. A. Morrison, 210 Main St., Hackensack, plans group frame, brick dwellings, Teaneck Rd. and Route 4. $150,000 or more. Site acquired.

N. Y., Baldwin—Dover Gardens, H. Avidan, pres. Dover Gardens, plans constructing group dwellings and sub-division, Dover Gardens. $140,000.

N. Y., Brooklyn—Adrain Van Sinderen, 40 Remsen St., plans by Cameron Clark, c/o owner, altering heating, plumbing in 6 story apartments, 423 Hicks St. $40,000 with fixtures.

N. Y., Brooklyn—Cameo Impvt. Corp., 1489 East 46th St., plans by I. Kallich, 375 Fulton St., constructing group 1 story, 22x40 ft., brick dwellings, about East 17th St. and Avenue W. $140,000.

N. Y., Brooklyn—Chestnut Studio Corp., 321 West 44th St., H. M. Warner, pres., has deferred taking bids until September or later for motion picture studio, 1262 East 14th St. $300,000. T. W. Golding, 14 West 40th St., New York, archt. Noted Mar. 11, C. D.—Mar. 19, E. N.-R.

N. Y., Brooklyn—Corporation, c/o J. Dorment, 66 Court St., plans by B. Driesler, 163 Remsen St., constructing group 2 story, brick dwellings, Marine Parkway and Fillmore Ave. $140,000 or more.

N. Y., Brooklyn—Edron Realty Corp., 58 Gelson Ave., plans by I. Seelig, 153 Pierrepont St., 6 story apartment, 50 Gelson Ave. $165,000.

N. Y., Brooklyn—Roman Catholic Church of St. Bernardette, 8201 13th Ave., plans by H. V. Murphy, 208 Livingston St., 1 story, brick church, 8201 13th Ace. Est. about $140,000.

N. Y., Brooklyn—Gondolier Realty Co., 240 Crown St., plans by Cohn Bros., 191 Joralemon St., 6 story apartment, 2 Stoddard Pl. $175,000.

N. Y., Brooklyn—Lemarl Realty Corp., c/o J. Marcowitz, 1317 Park Pl., Brooklyn, plans by Kavy & Kavovitt, 16 Court St., 6 story apartment, 1412 Ocean Ave. $165,000.

N. Y., Brooklyn—Seventy-One Ocean Parkway Corp., 71 Ocean Parkway, plans by Cohen Bros., 191 Joralemon St., 6 story apartment East 7th St. and Ocean Parkway. $260,000.

N. Y., Brooklyn—Waylin Holding Corp., 899 Nostrand Ave., plans by B. W. Dorfman, 56 Court St., constructing 6 story apartment, Caton Ave. and Linden Blvd. $400,000.

N. Y., Elmhurst—J. Greenholtz, c/o King & King, 40-09 82nd St., Jackson Heights, plans 6 story apartment, Elbertson St. and Whitney Ave. $150,000 or more.

N. Y., Elmhurst—Jacmar Operating Corp., 186 Remsen St., Brooklyn, plans by M. N. Weinstein, 93 Court St., Brooklyn, 6 story apartment, Whitney Ave. $235,000.

N. Y., Flushing—Kissena Park Homes, 163-18 Jamaica Ave., Jamaica, plans by H. Silman, c/o owner, group 2 story dwellings, 59th Ave. near 152nd St. $140,000.

N. Y., Forest Hills—Shure & Kaplan, 299 Crown St., Brooklyn, plans constructing 6 story apartment, Atom Pl. and Austin St. To exceed $250,000. Site acquired.

N. Y., Garrison—Friars of Atonement plans completed by J. J. Stanton, 160 5th Ave., New York, constructing hospital. Architect soon takes bids for same.

N. Y., Jackson Heights—Gutterman Developers, 189th St. and Northern Blvd., plans by S. M. Palm, 159-15 Northern Blvd., group frame dwellings, 31st Ave. and 90th St. $145,000.

N. Y., Laurelton—English Cottage Homes, Inc., 45-47 40th St., Woodside, plans by A. Fahr, c/o owner, group frame dwellings, Cross Island Blvd. and 131st Rd. $140,000.

N. Y., Little Neck—Desirable Homes, Inc., Marathon Parkway and Cambria Ave., plans group 40 dwellings (84 lots), Marathon Parkway and Cambria Ave. $140,000 or more.

N. Y., New Rochelle—Dickinson Realty Corp. plans apartment house with stores on first floor, 79 Locust Ave. $100,000-$150,000. Probably private plans.

N. Y., New York—Bermax Realty Corp., 1460 Macombs Rd., plans by L. I. Crausman, 332 East 149th St., 6 story apartment Morris Ave. and 182nd St. $140,000.

N. Y., New York—Bourman Biltmore Hotels Corp., 109 East 42nd St., plans by J. P. Gallagher, c/o owner, altering heating, plumbing in 16 story hotel, 400 Lexington Ave. $38,000 with fixtures.

N. Y., New York—Sailors Snug Harbor, 262 Greene St., plans by Corbett & MacMurray, 130 West 42nd St., altering heating, plumbing in three 5 story apartments, 13-15 and 9 East 8th St. $60,000.

N. Y., New York—Greenwood Cemetery, 52 Vanderbilt Ave., plans altering heating and plumbing, in two 6 story store and apartments, 218 East Bway. $40,000 with fixtures. Arthur Weiser, 240 Madison Ave., archt.

N. Y., New York—Julius Vogel, 342 Madison Ave., or c/o J. L. Ennis & Co., 500 5th Ave., plans 6 story apartment, 174th St. near St. Nicholas Ave. $140,000.

N. Y., New York—East River Savings Bank, 26 Cortland St., plans by S. Daub, 63 Park Row, altering heating, plumbing in four 5 story apartments, 1679 York Ave. $50,000.

★ **N. Y., New York** — Eight Gard... Place Corp., c/o J. Goldfein, 535 5th Av... Place constructing 6 story apartment, Sherm... Ave and McClellan St. $500,000 or mo... $5... purchased.

N. Y., New York—Excelsior Savin... Bank 221 West 57th St., plans by J. M. ... street 17 East 49th St., altering heating, plu... in three 5 story apartments, 1975 2nd Av... $65... 000 with fixtures.

N. Y., New York—Fifth Avenue a... 12th Street Corp., 55 5th Ave., plans by ... & Palmer, 17 East 49th St., altering ... story apartment, 431 West 57th St. $140,00...

N. Y., New York—Inch Corp., 15 B... St. plans by J. M. Berlinger, 17 East 4... St. altering heating, plumbing in 12 story ... ment, 405 Park Ave. $38,000 with fix...

N. Y., New York—O. L. P. Corp., ... A. Giordano, 2488 Grand Concourse, pla... constructing apartment, 217 East 199th St. $250,000 or more. Site acquired.

★ **N. Y., New York**—Pan American ... Assn., 745 5th Ave., plans by John ... Pope, 542 5th Ave., constructing 17 ... story hospital and medical school. $7,000,000. Site not selected.

N. Y., Rochester—Jewish Home for A... of Rochester, soon lets contract constructing ... firmary, 1162 St. Paul St., S. Firesto... 5... South Ave., archt. Noted Mar. 26, C. D.—Apr. 2, E. N.-R.

Pa., Sharon—Protected Home Circle, S. H. Hadley, pres., Boyle Bldg., sketches by Walker & Weeks, 2341 Carnegie Ave., Cleveland, O., rebuilding 4 or 5 story, basement, brick, steel office building, State St., after fire. $225,000

Tex., Galveston—Interstate Theatres and K. Hoblitzelle, pres., Galveston, Majestic Bldg., Dallas, and San Antonio, preliminary planning and surveying brick, rein.-con., steel, tile theatre, plain found. Private plans.

Tex., Harlingen—Lower Rio Grande Valley Mid-Winter Fair, A. L. Brooks, mgr., sketches display buildings, incl. livestock, dairy, poultry, general display buildings, grandstand, ... track (¼ mi.), paddocks, large general commercial and exhibit booths, housing facilities for farm machinery display, etc.

Tex., Seguin — Guadalupe College, Seguin, plans by P. G. Silber, 1919 West Summitt St., San Antonio, 3 story, rein.-con., hollow tile and stucco administration and girls' dormitory buildings and power plant, plain found. $160,000. Noted Feb. 21, C. D.—Feb. 27, E. N.-R.

★ **Wash., Parkland**—Pacific Lutheran College, campaign under way to raise $1,500,000 over 8 year period to build $100,000 fireproof library and classroom building, administration building, arts building, science hall, music building, chapel, girls' dormitory, lounge, kitchen, dining hall, boys' dormitory, gymnasiums, power house.

Wash., Seattle—S. L. Savidge, Broadway and East Union St., plans 14 story, 110x180 ft. apartment hotel on 7th and University Sts. Property purchased.

Wis., Milwaukee—Eaton Realty Co., 759 North Milwaukee St., soon lets contract two 2 story, basement, 24x112 ft. and one 2 story, basement 24x79 ft. apartment buildings on Blue Mound, H. Bogner, 759 North Milwaukee St., archt.

Ont., Toronto—St. Michael's Hospital, Bond St., plans addition to hospital, incl. administration offices, sisters' residence and private wards, Bond St. To exceed $150,000.

Que., Montreal—J. H. Doran, Chamber 426, 1396 Ste. Catherine St. W., preparing plans for 27 houses for Hill Crest Gardens Ltd. $270,000.

BIDS ASKED

N. J., Sussex—See "Contracts Awarded."

N. Y., Bayside—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Brooklyn—Sister Adorers of Precious Blood, 5302 Fort Hamilton Parkway, bids about May 25, constructing church and monastery, 5302 Fort Hamilton Ave., $140,000. W. J. Beegel, 13 East 37th St., New York, archt. Noted Apr. 10, C. D.—Apr. 16, E. N.-R.

N. Y., Little Neck—See "Contracts Awarded."

N. Y., Maspeth—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., Winfield—See "Contracts Awarded."

CONTRACTS AWARDED

Ariz., Ajo—Phelps Dodge Corp., remodeling and air conditioning office building, to E. W. Duhame, Phoenix, $20,597. Est. $22,000. Bids Apr. 11. Lesher & Mahoney, 1100 Title & Trust Bldg., Phoenix, archts.

Mo., St. Louis—St. Wenceslaus Catholic Parish, Wm. H. Hamtil, pastor, 3018 Oregon Ave., constructing 2 story, basement, 42x82x124 ft., rein.-con., brick parochial school and sisters residence, Oregon Ave. and Arsenal St., to Mississippi Valley Constr. Co., Wainwright Bldg. Bids Apr. 22. Noted Apr. 20, C. D.—Apr. 23, E. N.-R.

N. J., Sussex—Seckler & Sheperd, Lake Wallkill, Sussex, constructing group frame dwellings, Lake Wallkill, day labor and separate contracts. $140,000. Private plans.

†*Federal Government*

Commercial Buildings (Continued)

N. Y., Bayside—S. Goldstein, 215 Montague St., Brooklyn, group 2 story stores and dwellings, 212th St., separate contracts. $140,000. W. A. Cantor, archt. Noted Apr. 6, C. D.—Apr. 9. E. N.-R.

N. Y., Brighton—A. A. Simmons, 156 Woodbury St., Rochester, 50 residences on West Henrietta Rd. Owner builds and buys materials, incl. water supply system and septic tanks. $200,000. L. J. Brazill, 233 Saratoga Ave., Rochester, archt.

N. Y., Brooklyn—Clinton Vanderbilt Corp., 189 Montague St., 6 story apartment, separate contracts now being awarded. $140,000. M. E. Ungarlieder, 191 Joralemon St., archt.

N. Y., Brooklyn—Manack Realty Corp., 391 Fulton St., constructing group 1 story dwellings, 2266 East 18th St. and vicinity, day labor and separate contracts. $140,000. W. A. Lacerenza, 391 Fulton St., archt. Noted Apr. 9. C. D.—Apr. 16. E. N.-R.

N. Y., Little Neck—A. Goegel, 85-35 Parsons Blvd., Jamaica, constructing group 2 story, frame dwellings, Overbrook and Van Zandt Aves., day labor and separate contracts. $140,000. W. P. LaVallee, 132-17 106th St., Ozone Park, archt. Noted Apr. 6, C. D.—Apr. 9. E. N.-R.

N. Y., Maspeth—D. Salmow, 200 West 90th St., New York, constructing group frame dwellings, 63rd Pl. and 55th Ave., separate contracts. $140,000. B. Dreisler, c/o owner, archt. Noted Apr. 9, C. D.—Apr. 16, E. N.-R.

N. Y., New York—Clarking Realty Co., 120 Bway., altering heating, plumbing in 6 story store and apartment, 110 Cannon St., separate contracts now being awarded. $38,000. Private plans. Noted Apr. 10, C. D.—Apr. 16, E. N.-R.

N. Y., New York — Corporation, c/o D. J. Napoli, 40 West Burnside Ave., constructing 6 story apartment, Hull Ave. and Gun Hill Rd., separate contracts. $140,000. L. I. Crausman, 332 East 149th St., archt.

N. Y., New York—Llanfair Realty Co., 1414 Shakespeare Ave., 6 story apartment, 201st St. and Grand Concourse, separate contracts now being awarded. $140,000. Bates & Heindsmann, 2526 Webster Ave., archt.

N. Y., New York—Fifth Ave. and 12th St. Corp., 55 5th Ave., altering heating, plumbing in 5 story apartment, 337 East 16th St., separate contracts awarded. $40,000 with fixtures. Minoque & Palmer, c/o owner, and 17 East 49th St., archts. Noted Apr. 6, C. D.—Apr. 9. E. N.-R.

N. Y., New York—Robert and Grace LeRoy, 340 West 23rd St., altering heating, plumbing in two 4 story apartments, 335 West 19th St., separate contracts. $38,000 with fixtures. A. Grossman, 875 8th Ave., archt. Noted Apr. 9, C. D.—Apr. 16, E. N.-R.

N. Y., Rochester—Sibley, Lindsey & Curr, 228 East Main St., altering department store to Gorsline & Swan Constr. Co., 96 Pearl St., Rochester; escalator, to Otis Elevator Co., 130 East Main St., Rochester. Total est, $250,000. Noted Apr. 30, C. D.—May 7, E. N.-R.

N. Y., Syracuse—Gorsline & Swan, general contractors, 96 Pearl St., Rochester, structural steel for car facility building, Burnet Ave., for New York Central R.R. Co., 466 Lexington Ave., New York, to Leach Steel Corp., 80 Steel St., Rochester; piling, to Western Concrete Pile Co., 52 Vanderbilt Ave., New York. Noted Apr. 7, C. D.—Apr. 9, E. N.-R.

N. Y., Winfield—Woodside Homes Corp., 60-09 Woodside Ave., Woodside, constructing group 2 story, brick dwellings, 67th St., 47th, 48th and 49th Aves., separate contracts. $140,000. M. Palm, 159-15 Northern Blvd., Flushing, archt. Noted Apr. 9, C. D.—Apr. 16, E. N.-R.

O., Cleveland—R. B. Anderson, 308 Euclid Ave., 1 story, basement, 70x160 ft., brick, steel commercial building and theatre, 5826 Ridge Rd., to N. Pavla, 10518 Joan Ave. Est. $175,000. F. Matzinger, Empire Bldg., archt.

O., Cleveland—Ohio Bell Telephone Co., G. A. Kositsky, ch. engr., 750 Huron Rd., 2 story, basement 105 x 106 ft., rein-con., brick telephone exchange Blossom Park and Detroit Ave., to H. F. Juergens, 15430 Edgewater Dr. Est. $225,000. Noted Apr. 23—D.—Apr. 30, E. N.-R.

R. I., Providence—Two Hundred and Eighteen Waterman St. Co., J. Lisker, excavating for 3 story, basement, 84x190 ft. apartment, to F. Lepore, 461 Douglas Ave. Noted Apr. 20, C. D.—Apr. 23, E. N.-R.

★ **Va., Williamsburg**—Perry, Shaw & Hepburn, archts., 141 Milk St., Boston, Mass., 2½ story basement, 110 x 340 ft. brick, steel, stone, hotel, concrete found., incl. heating, plumbing, electricel work, for Owner, c/o architect, to J. Lowry, Inc. 630—5th Ave., New York. $750,000. Richardson & Gay, 12 Pearl St., Boston, Mass., engrs.

W. Va., Clarksburg — St. Mary's Hospital, (Catholic Church—Owner), constructing St. Mary's hospital building, to Southeastern Constr. Co., 218 West 2nd St., Charlotte, N. C., about $150,000.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Kingsburg — WINERY — Muscat Co-Operative Winery Assn., Kingsburg, plans win-

†*Federal Government*

ery addition for storage and cooperage quarters. Hy. 99. Est. $50,000 or more.

Calif., Los Angeles—BOTTLING PLANT—Balboa Brewing Co., 1834 North Main St., plans by W. D. McAllister, 1709 West 8th St., 2 story, 25,000 sq.ft. floor space, part Class A and part Class B bottling plant, 1834 North Main St. $200,000.

Calif., San Francisco—WAREHOUSE, etc.—Coffin-Reddington Co., 401 Mission St., plans by F. H. Meyer, Kohl Bldg., Class "A" warehouse, loft and office, downtown section. $150,000 or more.

Conn., East Hartford (br. Hartford)—PLANT—Hamilton Standard Propeller Co., 400 South Main Et., soon lets contract 100,000 sq.ft. floor space, brick, steel manufacturing plant for airplane propellers. $40,000 or more. Albert Kahn, Inc., New Center Bldg., Detroit, Mich., archts. Noted May 5, C. D.—May 7, E. N.-R.

Conn., Hartford—WAREHOUSE—Colts Patent Fire Arms Mfg. Co., 17 Van Dyke Ave., plans by Lester Beach Scheide, Inc., 100 Pearl St., 2 story, 120x200 ft., brick, steel warehouse, incl. recreation facilities, Van Dyke Ave. $120,000. Contract will be awarded without competition.

Conn., Waterbury—PLANT—Lux Clock Mfg. Co., 95 Johnson St., soon lets contract 1 story, basement, 3 story, basement, 40x160 ft. and 44x143 ft., brick, timber plant, Johnson St. $65,000. H. T. Moeckal, 33 Hill St., Naugatuck archt. Noted Apr. 16, C. D.—Apr. 23, E. N.-R.

Ga., Albany — PACKING PLANT — Cudahy Packing Co., 33rd and O Sts., Omaha, Neb., and main office, 401 East Ohio St., Chicago, Ill., plans packing plant. Est. $400,000, incl. $100,000 for machinery. T. J. Byrnes, ch. constr. engr. for owner, c/o Cudahy Packing Co., 33rd and O Sts., Omaha, Neb. Noted May 1, C. D.—May 7, E. N.-R.

La., New Orleans—INDUSTRIAL BUILDING—C. D. Mathews, archt., Balter Bldg., soon lets contract 162x425 ft. industrial building, plain found., Tulane Ave., for M. N. Tobias. Separate bids on sprinkler system, electrical work, plumbing fixtures, 2 pipe low pressure steam heating system.

Mass., Cambridge—SUBSTATION—Cambridge Electric Light Co., A. Snow, in charge, 46 Blackstone St., plans by W. L. Galvin, 34A Brattle St., and soon takes bids from selected list of bidders, 1 story, basement, 27x36 ft., brick, concrete electric substation. Mellen St. Equipment to be purchased by owner. Private plans on equipment.

Mass., Taunton — PLANT — Glenwood Range Co., 330 West Water St., making plans altering present 1 story, 150x160 ft. foundry to be used as enameling plant, incl. electric wiring, plumbing, etc., West Water St. To exceed $37,000.

Mass., Worcester — DAIRY — Blue Ribbon Dairy, E. Mellinsky, prop., 22 Spruce St., making plans 1 story, basement, fireproof dairy. Est. about $37,000. Private plans.

Mich., Detroit — BOTTLING WORKS — Koppitz-Melchers, Inc., Dubois and Atwater Sts., plans by Mildner & Fisher, 924 Hammond Bldg., 2 story, basement, 75x125 ft., brick, steel, rein.-con. bottling works for brewery, plain found. $40,000.

Mich., Trenton—WAREHOUSE—Trenton Valley Distillers Corp., plans by G. F. Diehl, 120 Madison Ave., 6 story, 85x210 ft., brick, cinder block, concrete warehouse for distillery, plain found. $175,000.

Mo., St. Louis—FACTORY—Kranz Automotive Body Co., 3032 Gravois Ave., soon takes bids constructing 1 story, 24x125 ft. automotive factory addition, Gravois and Minnesota Aves. L. Haefer, 3844 Utah Pl., archt.

Mo., St. Louis—City, preliminary plans constructing sewers in Laine Creek Sewer Dist. 3, $21,000; 13th Street Relief Sewer Dist., $60,000; Sect. C. Drainage Project on Riverview Dr., $12,000; and in Baden Sewer Dist. No. 10, $950. L. A. Pettus, city engr.

Mont., Great Falls—STOCK YARDS—Great Falls Livestock Yards Co., soon lets contract constructing (1st unit), 320x500 ft., frame stock yard, incl. plumbing, water system to 200 pens. Cottier & Herrington, 807 1st Natl. Bank Bldg., archts.

N. J., Newark—DISTILLERY—J. H. Reinfeld, Inc., Frelinghuysen Ave. and Noble St., soon lets contract 4 story, basement, 90x316 ft., brick, steel distillery, $200,000. F. Graf & Son, 48 Commerce St., archt. Noted Apr. 20, C. D.—May 7, E. N.-R.

N. J., Newark—WAREHOUSE—L. Bamberger & Co., 131 Market St., soon lets contract altering 6 story, basement, 110x117 ft., to existing warehouse, on Bank and Campbell Sts., R. D. Kahn & J. J. Knight, 56 West 45th St., New York, archts.

N. M., Albuquerque—BREWERY—Albuquerque Ice Co. plans remodeling ice plant into brewery. $80,000. New Mexico Brewing Co., lessee.

N. Y., Brooklyn—FACTORY—J. B. Williams, Inc., 423 38th St., plans by Koch & Wagner, 32 Court St., altering 2 story, brick factory, 423 38th St. $30,000 with equipment.

N. Y., Brooklyn—STORAGE TANKS and WAREHOUSE, etc.—Jerome Sherman, 245 Putnam Ave., plans steel storage tanks, warehouse and pumping unit, Brant and Setauket Sts. $312,000. Private plans.

N. Y., Buffalo—GRAIN ELEVATOR, etc.—Cooperative G.L.F. Mills, Inc., Chamber of Commerce Bldg., Buffalo, soon lets contract 160,000 bu. rein.-con. grain elevator warehouse and office, incl. drilling piles. To exceed $37,000. A. E. Baxter Eng. Co., 344 Delaware Ave., engrs.

N. Y., Buffalo—WAREHOUSE—Great Lakes Lumber Corp., 2625 Delaware Ave., plans reconstructing large warehouse, 2675 Delaware Ave., recently destroyed by fire. Private plans.

N. Y., Buffalo—WAREHOUSE—Howard Iron Wks., 281 Chicago St., plans rebuilding warehouse destroyed by fire as soon as fire loss has been adjusted. Private plans. Western Express Co., Buffalo, lessee.

N. Y., Middletown — PLANT — Pioneer Ice Cream Co., (Div. Horton Ice Cream Co.), 205 East 24th St., New York, plans constructing plant addition, Mohegan St.

N. Y., New York—GARAGE, etc.—New York Edison Co., 4 Irving Pl., plans altering garage and store, 708 1st Ave. Est. about $37,000 with equipment. Private plans.

N. Y., New York—PLANT—Hygrade Casket Corp., Mount Kisco, plans altering and equipping 6 story factory, Brook Ave. and East 148th St. $45,000. Site acquired. Architect not appointed.

N. Y., New York—SERVICE STATION etc.—Socony Vacuum Oil Co., 26 Bway., plans 1 story, service station and shop, 13th St. and 4th Ave. Est. about $37,000 incl. equipment. C. M. Spindler, c/o owner, archt.

★ **N. Y., Rochester**—STEAM TURBINE GENERATING PLANT—Rochester Gas & Electric Co., 89 East Ave., soon takes bids general contract and equipment for steam turbine generating plant, $1,000,000. E. M. Gilbert Eng. Corp., 512 Washington St., Reading, Pa., archts. Excavating for plant by own forces. Noted Nov. 19, C. D.—Nov. 21, E. N.-R.

N. C., Greensboro—PLANT—El Moro Cigar Co., Greensboro, plans repairing and altering plant. To exceed $100,000. Architect not appointed.

N. C., Greensboro—PLANT—Geo. C. Brown Co., plans woodworking plant. $40,000 or more. Architect not appointed.

O., Cleveland—FACTORY—Harshaw Chemical Co., c/o C. S. Park, 1945 East 97th St., plans 1 story, 85x120 ft., brick steel factory addition and crane runway, 1000 Harvard Ave. Private plans.

O., Dayton—FACTORY—National Cash Register Co., South Main St., plans by Schenck & Williams, 3rd Natl. Bldg., 1 story, 100 x 500 ft., rein.-con., brick factory, cafeteria, incl. kitchen and equipment, plain found., Main and L Sts. $75,000.

Pa., Carlisle—MILLS—Hollinzer Mills plans rebuilding and repairing rug and carpet mills. Est. about $37,000 with equipment. **Maturity indefinite.** Architect not appointed.

Pa., Logansport — WAREHOUSE — Pennsylvania Distillery Co., Inc., M. R. Weiner, in charge, 271 Provost St., Jersey City, N. J. I. Weiner, local mgr., Logansport, soon takes bids 12,500 bbl. capacity, brick warehouse. Private plans.

Pa., Millvale—MANUFACTURING PLANT—Duquesne Mine Supply Co., Mr. Higgins, pres., 2 Cross St., plans 1 story, probably steel manufacturing plant, 2 Cross St. Private plans. May build with own forces or let general contract.

Pa., Nazareth—PLANT—International Cement Co., 342 Madison Ave., New York, plans portland cement plant improvements. $80,000 or more.

Pa., Phila.—FILM EXCHANGE, etc.—Corporation, c/o Paramount Pictures, Inc., Paramount Bldg., New York, plans film exchange and storage, 12th and Summer Sts. $100,000.

Pa., Pittsburgh—BUS TERMINAL—Pennsylvania Greyhound Lines, S. Sundstrom, pres., 920 Superior Ave., N.E., Cleveland, O., plans by T. W. Lamb, 701 7th Ave., New York, 1 story, basement, brick, steel, terra cotta facing bus terminal, Liberty Ave. $100,000.

Pa., St. Marys—FACTORY—Stackpole Carbon Co., H. C. Stackpole, vice-pres. and mgr., St. Marys, plans 2 story, 65x130 ft., brick, steel factory, Tannery St. $80,000. Private plans.

Tenn., Memphis—WAREHOUSE, etc.—Vaccinol Products Corp., E. M. Reynolds, pres., plans 40x100 ft. warehouse, 40x60 ft. laboratory, Southern Ave. $40,000.

Vt., Burlington — BULK PLANT — Colonial Beacon Oil Co., Inc., 150 Shelburne Rd., making plans constructing bulk plant, incl. office building, storage tanks, garage and storehouse. Est. about $50,000. Private plans.

Wis., Beloit—FACTORY—Electric Equipment Mfg. Co. soon takes bids 1 story, 150x200 ft., brick, steel factory building, plain found. Private plans.

★ **Wis., Milwaukee**—TERMINAL—Pere Marquette R. R. Co., W. J. Horohan, pres., 741 North Milwaukee St., plans carferry terminal building, on Kinnickinnic River. $1,000,000.

Wis., Portage—FACTORY—Portage Hosiery Co. plans by Livermore & Samuelson, Madison, 2 story, basement, 60x118 ft., brick, steel factory building, plain found.

B. C., Minto City—MILL, etc.—Bridge River Reduction Co. Ltd., prepares plans constructing customs mill and reduction plant. A. G. Larson, engr.

Man., Winnipeg—MINING DEVELOPMENT—Reed Lake Mines Ltd., 307 Electric Ry. Bldg., F. C. Tomlinson, engr., to undertake development of 10 claims on Four Mill Island.

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Industrial Buildings (Continued)

N. S., Sydney—PLANT—Dominion Steel & Coal Corp. plans silica brick plant, old plant destroyed by fire. **Maturity indefinite.** Architect not appointed.

Ont., London — FACTORY — Hygrade Corrugated Products Ltd., 640 William St., plans by A. M. Piper, 1 Moore Bldg., and soon takes bids 1 story, 130x150 ft., brick addition to plant, plain found., William St. $40,000. Noted Mar. 2, C. D.—Mar. 5, E. N.-R.

Ont., Madse — QUARRY — Canadian Slate Products, 11 King St. W., Toronto, takes bids in about 1 month, 75x125 ft., 60x80 ft., 50x80 ft. buildings, all 1 story, at slate quarry near here. $40,000, incl. equipment, etc. Machinery and equipment is being ordered from Wales.

★ **Ont., Port Colbourne**—REFINERY—International Nickel Co. of Canada Ltd., Copper Cliff, and Bank of Commerce Bldg., Toronto, plans 3 electrolytic units at refinery. Davis St. Company is seeking fixed assessment of $1,000,000 from town. Vote of ratepayers last of May. Private plans.

Ont., Swastika — WAREHOUSES — Canadian Westinghouse Co., 555 King St. W., Toronto, preparing plans warehouses and electrical repair shop. $55,000. Equipment will also be purchased.

Ont., Windsor—MOTOR VEHICLE PLANT—Dirco Twin Truck Co. of Canada Ltd., J. E. McKeon, K. C., pres., making plans motor vehicle manufacturing plant. $40,000.

Que., Montreal—J. S. Archibald and Partners, 1440 Ste. Catharine St. W., preparing plans addition to Montreal Convalescent Home, Kent St. $450,000.

BIDS ASKED

Calif., Santa Cruz—SUPER-SERVICE STATION—Engineering Dpt. of Standard Oil Co., 225 Bush St., San Francisco, taking bids 80x125 ft., steel super-service station, 6 gasoline pumps and tanks to be installed, Mission and River Sts., for owners.

Mass., Boston—BUS TERMINAL—Eastern Massachusetts Street Railway, 38 Chauncy St., taking bids separate contracts 3 story, basement, 64 x 114 ft., brick, steel terminal, concrete found., Blackstone, Endicott and Cross Sts. To exceed $100,000. G. A. Cornet, 14 Central Ave., Lynn., archt. Noted Apr. 13, C. D.—Apr. 16, E. N.-R.

Mich., Detroit—PRESS SHOP—Albert Kahn, Inc., archts., New Center Bldg., taking bids 1 story, brick, steel, concrete press shop, plain found. Wyoming Ave., for Chrysler Corp., Massachusetts Ave., Highland Ave. $100,000.

N. Y., Brooklyn—JUNK PLANT—See "Contracts Awarded."

N. Y., Jamestown—SERVICE STATION—See "Contracts Awarded."

N. Y., Watertown—See "Contracts Awarded."

Pa., Pittsburgh—PLANT—Crucible Steel Co., B. F. Hufnagle, pres., 2001 Oliver Bldg., taking bids 1 story, basement, 30 x 42 ft., mill pickling plant, Reedsdale St. G. G. Gulland, plant engr., Labelle Works, Reedsdale St.

Pa., Pittsburgh—STEEL MILL—See "Contracts Awarded."

Wis., Wausau — FACTORY — See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Los Angeles—MARKET—Ralph's Grocery Co., 926 West 7th St., 1 story, mezzanine, 120x150 ft., rein.-con. market building, Figueroa and Vernon Sts., to S. N. Benjamin, 718 East 16th St. Est. exceeds $37,500. Noted Mar. 12, C. D.—Mar. 19, E. N.-R.

Calif., Oakland—WAREHOUSE—G. Wagner, 181 South Park St., San Francisco, owner and general contractor, 2 story, rein.-con. warehouse, Webster St. Est. $45,000. Owner builds. Owner awarded subcontracts for reinforcing steel, to W. F. Hauck, 280 San Bruno Ave., San Francisco•••electrical work, to R. Buteher, 1020 Sherwood Ave., San Jose•••plumbing and heating, to J. H. Pinkerton, 927 Howard St., San Francisco•••steel sash, to Detroit Steel Products Co., 63rd and Doyle Sts., Emeryville •••miscellaneous and structural steel, to Judson-Pacific Co., 604 Mission St., San Francisco. Armour & Co., 370 2nd St., lessee.

Conn., Danbury—FUR PLANT—Yameen Fur Co., A. Yameen, 42 River St., 2 story, 75x142 ft., concrete, steel plant, River St. Owner builds and will award separate contracts. Est. $40,000. E. B. Watson, Pershing Bldg., archt.

Conn., New Haven—WAREHOUSE—Turner Constr. Co., general contractors, 420 Lexington Ave., New York, carpentry, masonry, concrete work for warehouse, Dixwell Ave., to F. P. Sullivan, 127 Prospect St., East Haven, for P. Ballantine & Co., Inc., 57 Freeman St., Newark, N. J. Noted Apr. 28, C. D.—Apr. 30, E. N.-R., under "Contracts Awarded."

Conn., Pequabuck — PLANT — Cooper Oven Thermometer Co., Horrace Whittier Division, Pequabuck, excavating for 2 story, 45x164 ft., brick, steel plant addition. Owner builds under supervision B. R. Lockwood, Cambridge Rd., Bristol, construction supervisor. Excavating, to E. L. Dunn, 481 North Main St., Bristol. Est. $40,000. H. A. Hayden, 175 Main St., Bristol, archt.

Mich., Detroit — FOUNDRY, etc. — Chrysler Corp., 12200 East Jefferson Ave., 1 story, brick, steel, concrete foundry and machine shop building addition, plain found., to O. W. Burke Co., 1010 Fisher Bldg. Est. $100,000. Awarded Apr. 25. Noted June 12, C. D.—June 20, E. N.-R.

Mich., Detroit—FOUNDRY—Packard Motor Car Co., East Grand Blvd., 1 story, brick, steel, concrete foundry addition, plain found., Strong Ave., to Barton Malow Co., 1900 East Jefferson Ave., Est. $96,000. Albert Kahn, New Center Bldg., archt.

Mo., Jennings (St. Louis, P. O.)—Buck X-Ograph Co., 8709 X-Ograph Ave., general contract 2 story, 32x96 ft., X-Ograph plant, 8709 X-Ograph Ave., to Bumiller & Meyersieck, 1921 Marcus Ave., St. Louis. Bids Apr. 11.

Mo., Kansas City — COFFEE ROASTING PLANT—Chase & Sanborn, 595 Madison Ave., New York, installing coffee roasting plant in warehouse, capacity 1,000,000 lbs. per month, to Jabez Burns & Sons, 11th Ave. and 43rd St., New York. Est. exceeds $40,000.

Mo., St. Louis—BUS TERMINAL—Santa Fe Trail System, 1801 Washington Ave., Missouri Pacific Transportation Co., 1728 Olive St. and Missouri, Kansas & Oklahoma Coach Line, Inc., 500 Missouri Ave., East St. Louis, Ill., general contract, 1 story, basement, 36x62 ft. concrete, brick bus terminal building, and 40x78 ft. canopy, to H. B. Deal & Co., Inc., 1218 Olive St. Noted Jan. 29, C. D.—Feb. 6, E. N.-R.

Mo., St. Louis—DAIRY PLANT—South Side Consumers Dairy Co., 2921 Salena St., constructing 1 story, basement, 25x128 ft., rein.-con., brick addition to dairy plant, concrete found., 2917 Salena St., to Henry Hinrichs, Jr., 6440 Alabama Ave.

Neb., Omaha — BREWERY — Krug Brewing Co., general contract remodeling brewery, 25th St. and Krug Ave., to H. W. Stitt, Brandeis Theatre Bldg., about $75,000•••plumbing, heating, to J. J. Hanighan Co., 617 South 14th St. •••cork insulating, to Mundet Cork Corp., 506 South Main St., St. Louis, Mo. Est. exceeds $100,000. H. A. Raapke, Brandeis Theatre Bldg., archt.

N. J., Trenton — PLANT — Coca Cola Bottling Co. 216 1st Ave., Newark, constructing alterations to existing bottling plant, to C. J. Smith Constr. Co., 202 Academy St. Epple & Kahrs, 15 Washington St., Newark, archts.

N. Y., Albany—STORAGE—A. P. W. Paper Co., 1273 Bway., concrete piling for Storage Building E. North Albany St., to McArthur Piling Co., 19 West 44th St., New York. Noted Oct. 22, C. D.—Oct. 24, E. N.-R., under "Contracts Awarded."

N. Y., Brooklyn—JUNK PLANT—Pananello & D'Aniello, 4619 2nd Ave., Brooklyn, altering 2 story junk plant, 4619 2nd Ave., by separate contracts. $37,000 with equipment. C. A. Levitt, Bedford Ave., Brooklyn, archt.

N. Y., Endicott—GARAGE—Jones & Neorlando, general contractors, Endicott, structural steel and steel joists for garage, etc., for F. Valatte, 210 Washington St., to Binghamton Fdry. & Machine Co., Floral Ave., Binghamton •••millwork, to Bartlett Co., 34 Susquehanna St., Binghamton•••roofing, to Binghamton Slag Roofing Co., 209 Water St., Binghamton. Noted Apr. 14, C. D.—Apr. 16, E. N.-R.

N. Y., Falconer—PLANT—National Worsted Mills, J. C. Ellis, mgr., P. O. Box 666, Jamestown, rehabilitating 3 story, brick plant adjoining its present plant, separate contracts awarded. $40,000. Will install modern textile machinery and equipment. Noted Apr. 10, C. D. —Apr. 16, E. N.-R.

N. Y., Jamestown—SERVICE STATION—Sterling Oil Co., Oil City, Pa., constructing super-service station, 500 gal. steel tanks, electric pumps, air compressor, 504 West 3rd St., separate contracts. $37,000. Private plans. Noted Oct. 18, C. D.—Oct. 24, E. N.-R.

N. Y., New York—TRUCKING, STORAGE, etc.—Rockefeller Center, Inc., 30 Rockefeller Plaza, general contract trucking, storage and circulating space under buildings, 13-25 West 49th St., to Todd & Brown, 30 Rockefeller Plaza. Est. $65,000. Reinhard & Hofmeister, 30 Rockefeller Plaza, archts. Noted Apr. 9, C. D.—Apr. 16, E. N.-R., under "Unclassified."

N. Y., Rochester—STEAM TURBINE GENERATING PLANT—See "Proposed Work."

N. Y., Syracuse—WAREHOUSE—Austin Co., general contractors, 16112 Euclid Ave., Cleveland, O., sprinkler system for warehouse, Water St., for Continental Can Co., 100 East 42nd St., New York, to Grinnell Co., Inc., 440 Ridgewood Dr.; elevator, to Otis Elevator Co., State Tower Bldg. Noted Jan. 31, C. D.—Feb. 6, E. N.-R., under "Contracts Awarded."

N. Y., Watertown—PLANT—Stebbins Eng. & Mfg. Co., H. W. Duggan, in charge, constructing three 1 story, brick, steel buildings, plain found. Own forces and purchase materials. To exceed $37,000. Private plans.

O., Dayton—FACTORY—Chrysler Corp. (air temp. corp), 341 Massachusetts Ave., Detroit, Mich., remodelling existing brick, steel buildings, incl. new roofing, brick, concrete partitions, concrete floors, for plant for manufacture of air conditioning equipment. Lee St. to H. R. Blagg Co., 1229 East 3rd St., about $65,000. Geyer & Neuffer, Ludlow Arcade, archt.

Pa., Pittsburgh — STEEL MILL — Jones & Laughlin Steel Co., 3rd Ave. and Ross St., relocating present buildings and erecting additions to same, 34th St. and Monongahela River, own forces. Est. $42,000. D. L. Mekell, J. and L. Bldg., ch. engr. Private plans.

Pa., Punxsutawney — PACKING PLANT — Punxsutawney Beef & Provision Co., H. and J. A. Philiber, mgrs., packing plant, incl. 54x114 ft., brick, steel garage, 100x100 ft. top addition to slaughter house, altering and constructing 60x125 ft. packing house and boiler house. Owner builds and buys materials under supervision of Means Bros., Valier. Est. $150,000. Private plans.

Tex., San Antonio—PACKING PLANT—Roeslin & Provision Co., 1009 East Commerce St., Saltillo and Brazos Sts., refrigeration for packing plant, to York Ice & Mchy. Co., 401 Main Ave., $6,280•••packing plant equipment, to Menges-Mange, Inc., 1515 North Grand Ave., St. Louis, Mo., about $9,280•••steam piping, boiler, plumbing, to Jud & Ormand, Roman St., $5,270. Grand total $20,830. Noted Apr. 20, C. D.—Apr. 23, E. N.-R.

Vt., Newport—POWER HOUSE, etc.—Newport Electric Corp., Newport, 1 story, basement, 33x50 ft., brick power house and penstock, incl. heating, plumbing, electrical work, concrete found., to Vappi & MacDonald Co., Inc., 240 Sidney St., Cambridge, Mass. Bids Apr. 15, awarded about Apr. 27. Noted Apr. 13, C. D. —Apr. 16, E. N.-R.

Wis., Beloit — FACTORY — Fairbanks Morse Co., constructing 2 story, 81x231 ft., concrete pattern shop and 1 story, 168 ft., steel service building, to Cunningham Bros., Beloit.

Wis., Kaukauna—FACTORY—Thilmany Pulp & Paper Co., Kaukauna, constructing brick, steel building for beater room and bleach plant, to Permanent Constr. Co., 2712 North Halsn St., Milwaukee. Est. $40,000. Noted Mar. 11, C. D.—Mar. 19, E. N.-R.

Wis., Wausau — FACTORY — Marathon Bait Co., 1 story, 60 x 150 ft., brick, steel factory, plain found., day labor. Oppenhomer & Obel, Wausau, archts.

Wis., West Milwaukee — FACTORY — Chain Belt Co., 1600 West Bruce St., general contract 1 story, 74x172 ft. factory building addition to Plant 4, to Klug & Smith Co., 111 East Wisconsin Ave.•••plumbing, to W. Faust & Co., 401 North 63rd St.•••heating, to Wenzel & Henoch Co., 1524 North 27th St.•••electrical work, to Mogan Electric Co., 728 North Jefferson St.•••roofing, to Winding Roofing Co., 110 East Wisconsin Ave. Est. $50,000. Noted Apr. 17, C. D.—Apr. 23, E. N.-R.

N. B., McAdam—POWER HOUSE—Canadian Pacific R. R., Montreal, Que., constructing new power house, incl. 2 new boilers 250 lb. steam pressure, to Atwood Constr. Co., Montreal, Que. $145,000.

Ont., Copper Cliff—SMELTER—Fraser-Brace Eng. Co., general contractors, 107 Craig St., Montreal, Que., 12,000 tons structural steel for concentrator building and improvements, for International Nickel Co., Canada Ltd., to Dominion Bridge Co., 1139 Shaw St., Toronto; 512 ft. chimney, to Custodis Canadian Chimney Co., 660 Ste. Catharine St., Montreal, Que. (**Correction**—location of project.) Noted May 5, C. D.—May 7, E. N.-R.

Ont., Essex—FACTORY—Empire Foods Corp. Ltd., 159 Bay St., Toronto, 1 story, 60 x 105 ft. production building, 53 x 105 ft. receiving platform and separate power house, Talbot St., to Gosselin Constr. Co., 18 Felix St., Windsor; heating incl. boiler settings and stoker, to E. Leonard & Sons Ltd., 351 York St., London. Est. $60,000. Noted Apr. 24, C. D.—Apr. 30, E. N.-R., under "Contracts Awarded."

Ont., Hamilton—FACTORY—W. H. Cooper, general contractor, 42 James St., N., glazing 1 and 2 story, 121 x 471 ft., brick, steel factory for corrugated shipping containers, for Kraft Containers Ltd., 9047 Duke St., to Campbell Bros. Ltd., 77 Park St., N.•••painting, to Smith & Eastwood, 84 Garfield Ave. S.••• sprinklers, to Globe Automatic Sprinkler Co. of Canada Ltd., 6 Adelaide St. E., Toronto•••concrete, to Red-D-Mix-Hamilton Ltd., 501 Main St. E.•••reinforcing steel, to Burlington Steel Co. Ltd., Sherman Ave. N.•••structural steel, to Hamilton Bridge Co. Ltd., Bay St. N.••• stone, to Superior Stone Ltd., Victoria St., Kitchener. Noted Mar. 20, C. D.—Mar. 26, E. N.-R., under "Contracts Awarded."

Ont., New Toronto—FACTORY—Austin Co., general contractors, 16112 Euclid Ave., Cleveland, O., painting for brick can factory, for Continental Can Co. of Canada Ltd., to Roberts-Hetherington Co., 2658 Younge St., Toronto. Noted Feb. 18, C. D.—Feb. 20, E. N.-R.

Ont., Sault Ste. Marie — MILL — Chromium Mining & Smelting Corp., 6 James St., Hamilton, general contract 80x100 ft. and 20x112 ft. additional units, own forces; steel, to Hill Steel Constr. Co., 6 James St., Hamilton. Est. exceeds $37,000. Private plans. Noted Jan. 24, C. D.—Jan. 30, E. N.-R.

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†*Federal Government*